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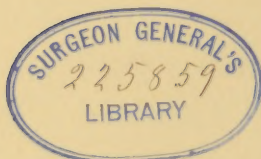
THROAT AND EAR TROUBLES

THROAT AND EAR TROUBLES

✓
BY
MACLEOD ~~TH~~ YEARSLEY, F.R.C.S.

WITH TWELVE ILLUSTRATIONS

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THROAT AND EAR TROUBLES

CHAPTER I

INTRODUCTORY

HEARING and speaking are complementary to each other. Without hearing there can be no appreciation of that highest form of animal communion, the human voice, either in ordinary conversation or in its more idealized and beautiful development of song. Conversely, spoken language cannot be acquired by the child without hearing. Both hearing and voice are, therefore, interdependent. Few persons realize the full importance of this, or they would earlier bestir themselves when they are threatened with deafness, and would not adopt the expectant attitude of waiting to get better without seeking expert advice. Early treatment and, better still, prevention of loss of hearing would mean a great diminution in the number of deaf people.

According to the Census for 1911, there are in England and Wales no less than 26,649 persons who are totally deaf. These figures, owing to the loose way in which the question in the schedule was framed,

are, however, practically worthless. Indeed, the explanatory text which accompanies them is little more than an elaborate apology for them on the part of the compilers. They are worthless because they really show nothing. There is no indication even as to how many were born deaf or acquired deafness in early life, nor do they give the least indication as to the prevalence of deafness other than total deafness. Only those who work among the deaf know what a scourge deafness is, and only a fraction of these realize how much of it could be prevented by the timely care of the ear, the throat, and the nose. In this volume the writer hopes to deal with the health of these organs in such a way that the prevention of deafness is always before the reader. The problem of deafness is one of the most important of the many social and medical questions of the present day, and there is no reason why its frequency should not be enormously reduced. There is in the domain of preventive medicine no field which can offer better opportunities and finer possibilities.

The social and civic disabilities involved by loss of hearing are very great. It precludes its victims from taking part in the civil, naval, and military services of the State; it prevents their progress in business, public and civic callings. In family and social life generally it prevents a number of persons from taking a share in the normal pleasures of life, rendering them apathetic, introspective, silent. The delights of music, of intellectual exchange, of

intercourse with those they love, are largely forbidden, so that the greatest of the simple human pleasures which make for happiness and tranquillity are irretrievably lost. The effects of loss of hearing in the adult are secondary only to those following upon loss of sight, and there are some even who would willingly exchange deafness for blindness.

But, severe as are the disabilities of deafness in the adult, they are far more serious in the young child. It is the greatest of all obstacles to education, and the blind child is infinitely better off than his deaf brother. During the period which precedes the school age, the normal child is prepared, through his hearing, for his coming struggle for existence. Between the ages of two and seven he is, consequently, rapidly developing, receiving, during every minute of his waking life, items of education through his ears, so that he learns to speak, to store up language, and to appreciate the meaning of the infinite variety of sounds around him. With the blind child, although one of the main entrances of instruction is closed to him, it is one by which general effects rather than exact thought impressions reach his brain. His speech acquirements and intellectual developments progress at as nearly equal rate as do those of the normal child. But the child who is born deaf, or has lost his hearing at an early age, before the development of speech, although he can obtain his general effects through his eyes, can, by reason of his deafness, neither obtain impressions of exact thought nor formulate his own thoughts in exact

terms. Consequently he begins his school life at seven in the intellectual condition of a child of two.

These considerations, tersely as they have, necessarily, been put, are alone sufficient to make the prevention of deafness a question of paramount importance, and, as the number of those who are born deaf is but a fraction compared with those who acquire deafness in infancy, childhood, and adult life, the study of the health of the ears, the throat, and the nose is worthy of careful attention for humanitarian and economic reasons.

It may at once be stated (and it cannot be too often reiterated) that the key to the prevention of deafness in the adult lies with the child, and, therefore, special insistence will be made upon the child in the following pages.

CHAPTER II

THE STRUCTURE AND FUNCTIONS OF THE ORGANS OF HEARING AND VOICE

IN order adequately to understand how disease may affect the ears, the throat, and the nose, it is necessary to have some knowledge of the way in which these organs are constructed, and the manner in which they work. A bare outline will be sufficient to give a good working understanding of their mechanism.

THE EAR

The ear is the organ of hearing. It consists essentially of a pair of special nerves (*auditory nerves*) connected with the brain, and an accessory apparatus serving the double purpose of protecting the delicate nerve endings and of conveying to them the waves of sound in such a way that they are converted into special nerve impulses. The ear is, in fact, a transformer of the mechanical stimuli supplied by sound into nerve impulses which can be conveyed to and interpreted by the brain.

These accessory apparatus, with the nerve endings, are contained, one on each side of the head, in two

bones called the *temporal bones*. The possession of two intact ears has been proved by experiment to be essential for correct localizing of sound. The apparatus is divided by anatomists into three parts: the *external ear*, consisting of the shell-like *auricle*

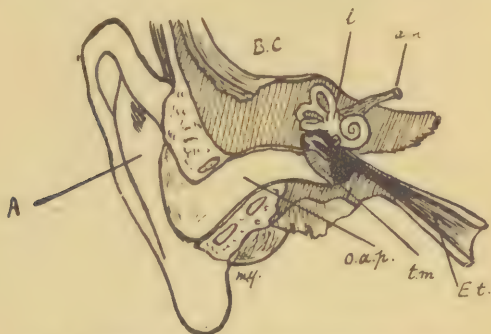


FIG. 1.—THE RIGHT EAR (SEMI-DIAGRAMMATIC).

A., Auricle. B.C., Brain cavity. O.a.p., Outer auditory passage. l., Labyrinth. t.m., Tympanic membrane. E.t., Eustachian tube. a.n., Auditory nerve. The bone is shaded. The cavity of the drum is black.

attached to the side of the head and a passage (*external auditory canal*) leading therefrom to the *middle ear*, and, lastly, the *internal ear*, containing the nerve endings so arranged as to form organs designed for the perception of sound and for the appreciation of position in space. The arrangement of these parts is shown diagrammatically in Fig. 1.

The MIDDLE EAR (*tympanum*, or drum) is shut off from the ear passage by a stretched membrane (*tympanic membrane*, drum-head) so constructed that it can vibrate to any sound. The tympanum itself

is a small cavity hollowed in the bone, communicating in front with the back of the nose by a narrow passage, the *Eustachian tube*, which serves a twofold purpose, keeping the air pressure in the drum equal to that in the outer ear passage, and also acting as a drain. Behind, the tympanum communicates with a cavity (*mastoid antrum*) in the back part (*mastoid*) of the temporal bone. Above the thin roof of the drum is the brain cavity, and beneath its floor is the commencement of the big *jugular vein* of the neck. The inner wall is formed of the bony case containing the internal ear, in which are two small openings, closed by membranes, called the *oval* and *round windows*. In this inner wall is also a canal through which passes the *facial nerve* on its way to the muscles of the face, interference with which by disease may cause facial paralysis. Stretching across the middle-ear cavity is a chain of small bones (*ossicles*, Fig. 2), named from their shape the hammer (*malleus*), anvil (*incus*), and stirrup (*stapes*). The handle of the hammer is attached to the inside of the drum-head so that it partakes in the vibrations of the latter, and these vibrations are communicated through the anvil to the stirrup, the footplate of which fits into the oval window so that its movements are passed on to the fluid in the internal ear.



FIG. 2.

The ossicles from the left ear, shown separate above, articulated below. H., Hammer. A., Anvil. S., Stirrup.

The INTERNAL EAR (*labyrinth*, Fig. 3) consists of

two parts, connected by a small cavity (*vestibule*), one in front which, coiled like a snail shell, is called the *cochlea*, one behind consisting of three fine looped tubes, the *semicircular canals*. The whole cavity of the labyrinth contains a fluid in which lies

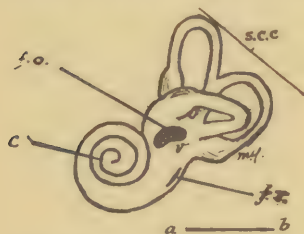


FIG. 3.—THE BONY LABYRINTH.

C., Cochlea. v., Vestibule. s.c.c., Semicircular canals. f.o., Oval window. f.r., Round window. a—b, Natural size.

a small membranous sac, also filled with fluid, and shaped like the bony case in which it lies. In this *membranous labyrinth* is the highly specialized series of nerve endings of the auditory nerve.

The vibrations communicated by the

stirrup bone affect the fluid in the bony labyrinth, and are transmitted through the membranous labyrinth to the fluid in it and so to these nerve endings, finding an outlet by the round window. The nerve endings in the semicircular canals are those by which a large part of the appreciation of our position in space is obtained, and abnormal disturbances of which give rise to giddiness (*vertigo*). Those in the cochlea (named, after the original describer, the *organ of Corti*) are concerned with the analysis of sound and initiate impulses sent through the auditory nerve to the brain, there to be interpreted and appreciated.

THE NOSE

The nose serves a threefold purpose: it is the organ of the sense of smell, it is the portal of the

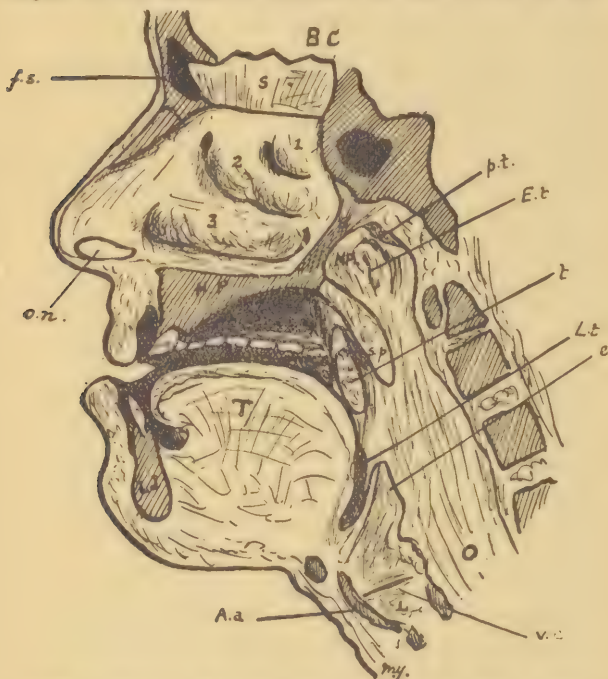


FIG. 4.—VERTICAL SECTION THROUGH THE FACE AND UPPER PART OF THE NECK.

- | | |
|---|-----------------------------------|
| s., Septum cut and turned up. | p.t., Pharyngeal tonsil. |
| B.C., Brain cavity. | E.t., Opening of Eustachian tube. |
| f.s., Frontal sinus. | t., Tonsil. |
| o.n., Outer nostril. | L.t., Lingual tonsil. |
| H.P., Hard palate. | e., Epiglottis. |
| s.p., Soft palate and uvula. | O., Oesophagus. |
| N.P., Naso-pharynx. | L., Larynx. |
| L.J., Lower jaw. | A.a., Adam's apple. |
| T., Tongue. | v.c., Right vocal cord. |
| 1, 2, 3, Upper, middle, and lower turbinates, | |

respiratory apparatus, and it helps to give resonance to the voice. Every one knows the first of these, very few appreciate the second. In man it is this second function that is of greatest importance, since by means of the nose the incoming air is warmed, moistened, and cleansed before it comes into contact with the delicate tissue of the lungs.

The nose (Fig. 4) is divided into a pair of parallel passages entered by the two nostrils which appear at the lower part of the prominent feature of the face, which is the only meaning of the term 'nose' to many people. The prominence of the nose is peculiar to man. The two nasal passages are divided by a vertical partition (*nasal septum*) formed by bone and gristle (cartilage). In civilized peoples this septum is very often bent, sometimes so much as to cause nasal obstruction; in savage races it is much more often straight. The two nasal passages open behind into a space which is the uppermost part of the passage leading down to the breathing and food passages. This space is called the *naso-pharynx* or *post-nasal space*, and is of great importance, as will be seen later.

The roof of the nose is formed by the front part of the floor of the brain cavity, and is pierced by numerous small holes, like a sieve. These openings are for the passage of the branches from the nerve of smell (*olfactory nerve*). The nasal floor is formed by the hard palate, which is also the roof of the mouth. The outer wall of the nose is formed by the bulk of the hollowed-out upper jaw bone, and has

on it three scroll-like projections formed of thin bone, called *turbinated bodies*. The lower is the longest, the middle being nearly as long, and the upper is very short and situated in the upper back part of the nose. The whole of the interior of the nose is covered by a thick mucous membrane, which, thinner over the septum, is very thick over the two lower turbinate bones. It is rich in blood-vessels, which are so arranged that the amount of blood in the membrane over the turbinates can be varied to suit the circumstances, and so warm the incoming air as much as is necessary. The membrane is also well supplied with glands, which secrete a watery fluid with which air passing through the nose can be saturated with moisture.

In order that the bones of the face may be both bulky and light, they are hollowed out by cavities. The upper jaw bones, for instance, are hollowed out on either side, the cavity in each being known as the *maxillary antrum*. In the upper part of the nose are also many cavities, whilst, further, there are two (*frontal sinuses*) in the *frontal bone* forming the forehead, and two at the back of the nose in the wedge-shaped bone (*sphenoid*) which binds together the bones forming the base of the skull. All these cavities communicate with the interior of the nose, and thus the whole arrangement forms a hollow sounding-board which gives resonance to the voice. This intercommunication, however, also means that the cavities may participate in inflammations spreading from the nose, or that abscesses occurring

in them may discharge into the nose. In the case of the maxillary antrum, an abscess may be formed therein from disease of the teeth, the fangs of which often project into the cavity, which abscess may be the cause of nasal discharge on the side affected.

Mention has already been made of the *naso-pharynx*, or space behind the nose. It is the space lying above the level of the hard palate, into which open the two nasal chambers. Into it also open the *Eustachian tubes*, leading from the ears. These openings are partly surrounded by projections made by the cartilages which form the tubes. In the roof of the space is a tonsil, called the *pharyngeal tonsil*, enlargement of which constitutes the growth familiarly known as *adenoids*. This tonsil extends into the recesses which exist behind the projections of the Eustachian tubes.

It will at once be seen that the post-nasal space is a spot at which many passages meet. There are the two nasal passages in front, and the Eustachian tubes at the sides, whilst below it opens into the space behind the mouth into which open the mouth, and, below, the food and air passages. The *naso-pharynx* is thus an anatomical point to which infections may come from the nose, ears, mouth, lungs, and gullet, or from which infections may spread to these parts. This fact is of great importance, for it gives the key to many of the diseases which affect the ears and throat.

Before going further it will be as well to turn attention to the anatomy of

THE MOUTH (Fig. 5)

The lip-surrounded opening popularly known as the mouth leads into a cavity between the upper and lower jaws, the roof of which is formed by the hard and soft palate, the floor being occupied by the tongue. The latter, when the mouth is closed, fits closely into the dome formed by the palate. The whole cavity is roughly cubic in shape and opens behind into the throat. This opening (*fauces*) is bounded above by the *soft palate*, with the *uvula* depending from its centre, and below by the base of the tongue. The soft palate splits on either side and forms the *pillars of the fauces*. Between these two pillars on either side are the *tonsils*.



FIG. 5.—THE MOUTH.

u., Uvula. p.p., Pillars of fauces, with tonsil between.

If the cavities of the nose and mouth be compared, it will be seen that the former is constructed as two

elongated passages, with projections on either side covered by a tissue capable of enlarging with in-



FIG. 6.

A cross section through the nose. The bone is represented shaded, the cavities of the nasal passages black, to show the septum and the projection of the turbinates.

creased blood supply, of secreting a watery fluid, and of catching and holding foreign matters. The nasal secretions are also capable, in some degree, of killing micro-organisms. The whole mechanism is, therefore, so arranged as slightly to delay the incoming air, warming it, saturating it with moisture, and freeing it from impurities before it passes into the naso-

pharynx to go down to the lungs.

That portion of the nose which serves the sense of smell is a small patch of slightly yellowish mucous membrane, about the size of a threepenny piece, situated high up behind, over the upper turbinate body and that part of the septum opposite to it. Owing to its high position, sniffing has to be resorted to in order that odoriferous particles may reach it.

The mouth has none of the arrangements of the nose for preparing the air for respiration. It is a comparatively large and smooth cavity, and is unable

appreciably to warm the air, to give it moisture, or to purify it. Therefore there is no comparison between the mouth and the nose as to suitability for the preparation of the air required in breathing. One has not to go far for an illustration, it is afforded by a cold in the head. When this causes blockage of the nose, so that breathing has to be carried on through the mouth, especially during sleep, the parched mouth and throat, the husky voice, and the unpleasant taste, all demonstrate the detrimental effects of mouth *versus* nose breathing. It is the possession of a nose which enables man to breathe with equal comfort in the heat of the tropics or the cold of the poles.

THE THROAT

Behind the mouth is a space which, with its extension above behind the nose (nasopharynx), is called the *pharynx*. Below, about the level of the top of the Adam's apple, it opens into two passages: one in front, the air passage; and one behind, the food passage. The former leads into the wind-pipe (*trachea*) through the voice-box, or *larynx*. The larynx contains the organ of voice. It is a box-like arrangement made of cartilage, containing two stretched membranes, the *vocal cords*, the vibrations of which, by air driven up from the chest below, give rise to voice. The voice thus formed is manipulated into articulate speech by means of the movements of the tongue and lips. These vocal cords are acted upon by appropriate muscles. The projection

of the larynx forms the Adam's apple. At the upper opening of the larynx is a leaf-shaped piece of cartilage (*epiglottis*) which partially closes it during the act of swallowing, so that food is prevented from entering it. Behind the larynx is the commencement of the *æsophagus*, or gullet.

CHAPTER III

THE IMPORTANCE OF NASAL BREATHING AND THE DISORDERS WHICH LEAD TO NASAL OBSTRUCTION

SOME eighty to ninety per cent. of all forms of deafness is due to affections of the Eustachian tube and tympanum ('middle-ear deafness'), and since quite ninety per cent. of such troubles have their origin in the nose and naso-pharynx, it is with diseases of the nose that we must deal first.

The symptoms which arise from disease of the nose are mainly discharge, bleeding, pain, and obstruction sufficient to prevent proper nasal breathing. Of these, the first and last named are the most important and most frequent. Bleeding may arise from a variety of causes, to be noted later; pain is not often great, and is more usually manifested as aching across the bridge of the nose, or as headache. Headache due to nasal causes is characteristic and may be severe. Starting at the root of the nose, it spreads fanwise over the forehead to the top of the head. Occasionally aching or throbbing behind the eyes is experienced.

Diseases of the nose may be divided into those of the naso-pharynx, the nasal passages, and the accessory sinuses, as the cavities which have been

mentioned as opening into the nose are called. Owing to its importance in the child, and the fact that its disorders furnish a key to so many other conditions of nose and ear, it is preferable to take it first :

THE NASO-PHARYNX

The commonest of all troubles in the naso-pharynx is *adenoids*, due to enlargement of the pharyngeal tonsil. This tonsil, with the two found at the back of the mouth, and one situated at the root of the tongue, are structures belonging to the first line of defence of the body against microbic infection. Unfortunately, this defence is very liable to break down, especially if overworked or meeting with too powerful an infection. The cause of adenoids, despite the fact that so much has been written about it, is really a simple question of infection. Hence they are common after the infectious fevers, especially scarlet fever, measles, and diphtheria, or are due to colds, particularly in children of the so-called 'lymphatic temperament.' Another fruitful cause amongst the poor is overcrowding, especially when the family is herded together in one small, badly ventilated apartment. Improper artificial feeding and the use of the abominable and pernicious 'comforter' (a potent source of infection) are also important causes. In many of these conditions there are two factors at work, infection by microbes and lowered vitality. Whilst mentioning improper artificial feeding it may be pointed out that normal



FIG. 7.—A BOY WITH ADENOIDS.
Showing 'adenoid face' and deformed chest.

suckling promotes a healthy exercise of the nose by breathing, which tends to the proper development of its passages and of the naso-pharynx. One has only to watch a child at the breast to be convinced of this. This forms an additional argument in favour of all mothers being 'complete mothers' whenever it is possible.

Adenoids affect the child in two ways, by size and by infection. They may block the naso-pharynx to such an extent as to prevent nasal breathing, and hamper the proper action of the muscles of the soft palate. As these muscles open the Eustachian tubes, the latter cannot work properly, and the ventilation of the middle ear is thus interfered with. The blocking of the naso-pharynx results in arrested development of the nasal passages from inaction, the mouth is continually open, and all the evils of mouth-breathing are established. The pinched, dull, stupid expression (Fig. 7) that this entails is so characteristic that it has been called the 'adenoid face.'

But important as is this obstructive action, the effect of adenoids as an infecting centre is still more so. If a mass of adenoids (Fig. 8) which has been removed be examined, it will be seen that it is arranged in ridges with deep clefts between. These clefts form an excellent nest in which microbes can multiply. Hence a common symptom is the frequent catching of colds. From the mass as a centre, infection can spread forwards into the nose, causing inflammation, swelling, nasal discharge and obstruc-

tion, and sideways into the Eustachian tubes. Irritating secretions may also pass downwards into the larynx, causing attacks of laryngitis, or into the stomach, resulting in attacks of sickness, especially in the morning after sleep. Adenoids

thus lay the foundation of middle-ear disease, nasal disease, disorders of the digestion and of the lungs ; hence

the child is weakly, narrow-chested, and liable to bronchitis and consumption. They are also a very common cause, together with septic tonsils, of enlarged glands in the neck. Partly due to the absorption into the system of poisons from septic adenoids, and partly owing to the obstruction they cause to the circulation in the brain, the adenoid child suffers from a slowness of mental operation, combined with a difficulty of sustained application that is very marked. This often causes unmerited punishment at school.

The only rational treatment of adenoids is their complete removal, followed by careful after treatment. Unless the latter is carried out, the nasopharynx may become reinfected from the nose ;



FIG. 8.—A MASS OF ADENOIDS, REMOVED BY OPERATION.

which was infected in the first place by the adenoids. It is true that adenoids tend to become smaller and to retrogress at about the age of six to ten, but they may leave traces of their presence in an undeveloped nose, a high arched and narrow palate, and an undeveloped, narrow chest, that tell against the child's welfare in after-life. Another point of importance is that they may leave the Eustachian tubes more or less tied up by adhesions, so that their proper function is interfered with and deafness results in young adult life.

THE NASAL PASSAGES

The common troubles affecting the nasal passages are due to the results of inflammation or to deformities of the septum. In children, inflammation is generally due to infection from adenoids, and the turbinate bodies become swollen and add to the obstruction. Sometimes the nose becomes inflamed from the presence of a foreign body, and children are very fond of putting small stones, buttons, and the like into the nostril. It may be said that, as a general rule, obstruction of and discharge from one nostril in a child almost always points to a foreign body. In such cases no attempt should be made to remove it, except by a doctor. Unskilled intervention may do much harm to the delicate structures of the nose.

In adults, inflammation of the nasal passages may be due to colds, to improper drainage of the nose

from a deformity of the septum, to disease of one or more of the accessory cavities, or to such general causes as anæmia, poisoning from digestive troubles and habitual constipation, and the like. Repeated attacks of inflammation lead to permanent enlargement of the

turbinates, especially the front or back ends of the lower turbinate, or of the bulk of the middle turbinate. Fig. 9 shows the sites of these enlargements.

A more or less chronic ca-

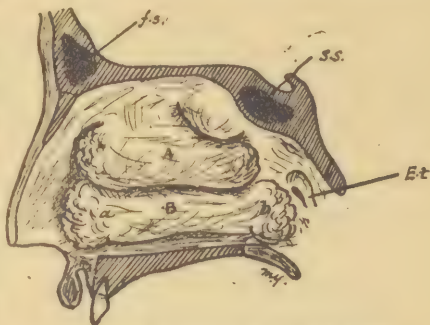


FIG. 9.—THE RIGHT SIDE OF THE NOSE.

Showing the most common enlargements of the turbinates. *E.t.*, Eustachian tube. *A.*, Middle turbinate. *B.*, Lower turbinate, with enlargement of anterior end (*a*), and posterior end (*b*). *f.s.*, Frontal sinus. *s.s.*, Sphenoidal sinus.

tarrh occurs, spreading back to the naso-pharynx and down into the larynx, with discharge and obstruction. When the hinder ends of the lower turbinates are enlarged, they block the back of the nose and keep the naso-pharynx more or less full of irritating secretions, which drop down and may be swallowed, especially during sleep. In bad cases recurrent attacks of laryngitis may be thus set up, as well as digestive troubles. The continual bathing of the ends of the Eustachian tubes in these irritating secretions is a potent cause of middle-ear disorders, the openings

of the tubes becoming swollen, so that the passage is blocked and inflammation is set up which spreads upwards to the tympanum.

A characteristic effect of enlargement of the middle turbinates is that they press upon the septum and irritate the nerves thereof in such a way as to set up headaches. Many headaches are due to this cause. They may also cause attacks of asthma in the same way, a condition which can usually be easily relieved by reducing the pressure.

The effect of long continued inflammation of the nasal passages is, in the end, often to cause shrinking of the mucous membrane. This is because the results of inflammation is to form new tissue, equivalent to scar tissue, which contracts. The obstruction then gives place to greater space, and a roomy nose ensues, through which the air passes too quickly, so that the secretions become easily dried and form crusts.

There is another condition of the nose, in which the passages become too roomy from shrinking of the mucous membrane. This is accompanied by drying of the secretions, forming crusts which decompose and smell badly, so that the disease has been called *ozæna*, from the Greek word *ὄζη*, stench. The smell is not noticeable to the patient, but is very evident to those around him, and the disease is probably the result of purulent inflammation of the nose in childhood. *Ozæna* is a very difficult condition to treat, and, therefore, should be prevented, when possible, by care of the nose in childhood.

Recent research seems to point to a special microbe as responsible for these cases.

DEFORMITIES OF THE SEPTUM

Deformities of the septum form a very common cause of nasal obstruction. They may be due to injury or to disorders of the naso-pharynx in earlier years, but there are many cases which are not thus caused. Deformities of the septum are uncommon before puberty, and it has been suggested that they are often due to the fact that, owing to the downward development of the nose and face in man instead of a forward growth, as in the lower animals, the septum has to accommodate itself by growing downwards and thus becomes bent. This downward development of nose and face is the result of the expansion of the brain cavity forwards to make room for the front (intellectual) part of the brain.

The septum may be bent into a variety of forms, obstructing one or both sides. The deformity is often accentuated by thickening of the bone and cartilage, an obstruction (Fig. 10) which not only presses upon the other structures of the nose, but interferes with proper nasal drainage. Infections,

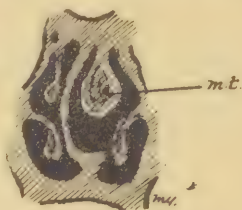


FIG. 10.

Section of nasal passages, with bend of septum to one side, the concavity occupied by an enlarged middle turbinate (*m.t.*).

especially those of the common cold, easily obtain a hold, and inflammation, often chronic and leading to permanent catarrh, occurs. A bent septum may press upon the middle turbinate and cause headache or asthma. When a large bend to one side occurs, the middle turbinate on the opposite side may enlarge to fill the concavity (Fig. 10). A common form of bending is one at the back, with a bony outgrowth, which, by its pressure on the hinder part of the lower turbinate, causes the latter to enlarge and act as has been described above. This is probably one of the commonest causes of catarrhal deafness in young adults. The bony outgrowth may exist for some time without causing much inconvenience, until a cold gives rise to swelling of the lower turbinate sufficient to bring it into contact with the septum; the irritation of the bony outgrowth keeps up the swelling of the turbinate until its hind end is permanently enlarged and projects into the naso-pharynx. The secretions from this are poured into the naso-pharynx and bathe, more or less continually, the Eustachian opening, which, by constant irritation, becomes swollen and affected by chronic catarrh.

Until quite recently the operative treatment of deformities of the septum was unsatisfactory, consisting of various cutting operations upon the cartilage, or forcible fracture of the bone. Splints had to be worn in the nose for some time after, causing much discomfort, and the results were not good. Modern nasal surgery has, however, developed an operation giving excellent results, and one in

which, provided the procedure has been skilfully performed, the relief is permanent.

THE ACCESSORY SINUSES

These cavities, which open into the nasal passages, may be the seat of inflammation or abscess. The number of cavities is ten, five on each side, two *frontal sinuses* in the frontal bone (in the forehead), two *maxillary sinuses* in the upper jaw bones, two *sphenoidal sinuses* in the wedge-shaped sphenoid bone at the base of the skull in the back part of the roof of the nose, and a large mass of cells on either side of the upper part of the nose, the *ethmoid cells*, each mass being divided into two, back and front. These sinuses contain air, and act as sounding-boards for the purpose of giving resonance to the voice.

The most commonly affected cavity is the maxillary sinus, and abscess in it may result from a diseased tooth, or may be due to extension of inflammation from the interior of the nose. Influenza is a common cause of such abscesses. The symptoms resulting from these abscesses is discharge of matter from the nostril on the affected side (especially on bending the head forward), and headache, often intense and persistent. The next most common cavity to be diseased is the frontal sinus, giving rise to discharge and intense frontal headache on the side affected, often with tenderness over the eye just under the brow. Sometimes the discharge may find its way from the frontal

sinus to the maxillary sinus (or antrum) and infect it, so that both cavities are affected. In frontal sinus trouble of long duration, the front mass of ethmoid cells usually also becomes infected.

Abscess of the sphenoidal sinus is much less common, but, when present, results in dull headache, usually at the top of the head, and discharge of matter. If allowed to progress, it may end fatally by meningitis.

The discharge from a diseased sinus may find its way into the naso-pharynx and be swallowed, especially during sleep, so causing digestive disturbances, or it may set up a chronic inflammation of the pharynx with all the troublesome results of that condition.

NASAL POLYPUS

A common cause of nasal obstruction is due to *nasal polypi*. These were, at one time, considered as tumours, but are really due to great swelling of the membrane covering the middle turbinate body, forming gelatinous, oyster-like masses. They may be due to long continued inflammation, or to the continuous irritation of discharge coming from a diseased accessory cavity. They are common, therefore, in chronic abscess of the frontal sinus or maxillary antrum.

BLEEDING FROM THE NOSE

The causes of bleeding from the nose (*epistaxis*) may be mentioned here. The bleeding may be

profuse and severe enough to necessitate plugging the nose, or limited to a mere spot or streak of blood. The most common cause is, of course, injury. Other causes are : deformity of the septum, especially in the front part of the nose ; chronic ulcer of the septum ; tumours of the nose, especially those of a cancerous nature ; such infectious diseases as typhoid fever, diphtheria of the nose, etc. ; valvular heart disease ; obstruction to the circulation in the liver ; constitutional diseases, such as scurvy and anæmia ; Bright's disease ; and degeneration of the small arteries (*arteriosclerosis*).

EFFECTS OF CAUTERIZATION IN THE NOSE

For many years the galvano-cautery has been employed in the treatment of certain nasal diseases. Surgeons are, however, beginning to discard this method. Although it may give temporary relief, its employment is attended with unnecessary destruction of tissue, whereby the proper function of the nasal mucous membrane is interfered with. Repeated cauterizations are undoubtedly pernicious, leaving the nose in a much worse condition than it was originally. Carefully devised cutting operations are better surgically and ensure preservation of function.

CHAPTER IV

ENLARGED TONSILS AND OTHER DISORDERS OF THE THROAT

THE description of diseases of the throat may be arranged under the three heads of tonsils, soft palate, pharynx. The larynx and its troubles requires a section to itself.

THE TONSILS

As has been pointed out, the tonsils situated on either side of the back of the mouth (*faucial tonsils*), together with the pharyngeal tonsil in the roof of the naso-pharynx, belong to the first line of defence of the body against microbic invasion. They are, as it were, sentinels who guard against hostile organisms, and, like human sentinels in war, may be overpowered and damaged by too powerful an enemy. There is, besides, at the base of the tongue, another mass of similar nature (Fig. 4, *L.t.*), the *lingual tonsil*, which completes what is practically a ring of tonsil tissue surrounding the entrance to the air and food passages. This ring was described originally by Waldeyer, and is called, after him, 'Waldeyer's ring.' It is a well-known fact that the pharyngeal tonsil, although often enlarged to form adenoids

which may persist for some time unless removed, is normally only in action up to about the age of ten years. It is possible, therefore, that the rest of Waldeyer's ring plays a like limited part in the economy, and that the faucial tonsils and the lingual tonsil really only exercise their function in early life. There is a

growing tendency among surgeons to recognize this fact, and to be loath to remove the faucial tonsils in children except for special and adequate reasons. It is not infrequently observed that the faucial tonsils vary in size in children, and this is probably due to the fact that they are exercising their special func-

tion, so that mere enlargement is not *per se* a sufficient cause for their removal.

The faucial tonsils are oval masses of tissue pitted with small openings leading into pockets or *crypts*, seen more easily when the tonsils are enlarged (Fig. 11). Most of these crypts have a downward and outward direction, which may impede their proper drainage. They may, therefore, easily be-



FIG. 11.—ENLARGED FAUCIAL TONSILS, SHOWING CRYPTS.

come inflamed by the presence of microbes, which obtain an easy lodgment, and repeated attacks of inflammation may lead to permanent enlargement, as shown in the figure. When infection has been too much for the tonsils to deal with, the crypts may become septic, and their owner is poisoned by the absorption of their contents. Thus the tonsils may become a menace for two reasons, great enlargement and septic inflammation.

The tonsils may become infected in the course of one of the infectious fevers, especially in diphtheria and scarlet fever, or from some local source of infection in the mouth. Decayed and septic teeth, and especially the condition of the gums known as *pyorrhœa*, are common causes. The way in which infection may reach the tonsil from the teeth has been ingeniously shown by placing a few particles of blue dye on a molar tooth; within half an hour a small triangular stream of the dye may be seen with its base at the tooth and its apex at the tonsil.

Enlargement of the tonsils may be so great that they meet in the mid-line of the opening between the mouth and the pharynx, with the uvula between them. This causes an impediment to swallowing, and, if the enlargement extends backwards, as is sometimes the case, they may so block the pharynx as to impede nasal breathing. When the inflammation is septic, small, whitish masses may be seen in the tonsil crypts. The irritating secretions add further to the inflammation and, passing backwards into the pharynx, infect it and inflame it, causing

cough. The inflammation of the pharynx may spread up the Eustachian tubes, causing middle-ear trouble, and may also infect the nose. As with adenoids, the secretions may pass into the stomach and larynx, resulting in digestive disturbances and laryngitis. From absorption of the septic secretions, the child deteriorates in health, and the glands in his neck become enlarged and inflamed, so that the bacillus of tubercle gains a ready entrance. It is now a well-established fact that the poisons of rheumatic fever, cerebro-spinal meningitis ('spotted fever'), infantile paralysis, and chorea ('St. Vitus's Dance') enter the system through the tonsils; and that tuberculosis of the glands of the neck occurs by the same route.

The removal of tonsils in the child is, therefore, fully justified when they are so much enlarged as to block the pharynx, or when they have become septic, and the result of operation, when efficiently performed in such cases, is usually very gratifying.

In the adult, the tonsils are in the position of structures which have ceased to work and usually give no trouble. They may, however, be the seat of repeated attacks of inflammation (*tonsillitis*). This may lead to the establishment of an abscess in the tissues round the tonsil, forming what is known as quinsy, or *peritonsillar abscess*. Sometimes the upper end of the tonsil is so formed as to have a deep pit behind it, in which secretions collect, become septic, and cause tonsillitis, and it is in these cases that quinsy is specially liable to occur, and, unless

remedied by appropriate surgical treatment, to occur in repeated attacks at varying intervals.

The small, chronically inflamed tonsil is often a source of continual irritation in the adult, inducing an irritable pharynx and cough.

As in the child, the crypts, or pockets, of the adult tonsil may become blocked, inflamed, and septic, so that repeated attacks of tonsillitis (*follicular tonsillitis*) result, with pain and fever. Such cases are sometimes associated with rheumatism, and it is through such tonsils that the poison of rheumatic fever gains its entrance.

Since the tonsils in the adult have probably ceased to perform their function, there is less need for hesitation as to their removal, and, when they are of the small and irritable variety, or when they are the seat of repeated inflammations, or the cause of recurrent quinsies, they are much better removed. Septic tonsils are also a frequent cause of foul breath.

With the advance of modern surgery, the operation of removal of the tonsil has undergone a considerable change. In former days, most surgeons were content to amputate the projecting portion of the tonsil with a guillotine, but this frequently failed because it did not remove the whole tonsil, and, when parts of the crypts remained in the portion left, the result was often disappointing. The general consensus of opinion in the present day is that, when the tonsils have to be removed, it is unsurgical to do what is only a partial operation, leaving portions

of the offending tissue, and that they should be removed by dissecting them out *en masse*. This change from the older and less perfect method of operating has given greatly improved results.

It is well to mention here that removal of the tonsils, provided it is performed efficiently and without damage to the soft palate, is not injurious to the voice, and that the popular idea that operations upon the tonsils interfere with the sexual functions is an absurd fallacy.

It may also be pointed out that, when the faucial tonsils are enlarged in children, there is also always, or nearly always, a co-existing enlargement of the pharyngeal tonsil.

Like the other tonsils, the *lingual tonsil* is at its greatest development in young children, and usually begins to shrink at puberty, although it may often remain undiminished in size in adults. As a rule, the mass of lingual tonsil is greatly reduced in adults, but it may become, and not infrequently is, enlarged. Like the faucial tonsils, it may also be the subject of attacks of inflammation, and an abscess may form in it.

Enlargement of the lingual tonsil is rare in children; when it occurs it does so usually between the ages of twenty and forty years. It is more common in women, and the enlargement is probably the result of repeated or continuous infection. Enlargement may not cause any symptoms at all, but when it does do so it produces the feeling of a foreign body at the base of the tongue, usually a pricking sensation,

as of a fish-bone or splinter. Not infrequently it induces troublesome fits of coughing. The use of the voice increases the symptoms, but pain is rare.

With enlargement of the lingual tonsil there may be also small varicose veins in its tissue, or these may occur without any increase of size of the tonsil itself. They cause symptoms of scraping, burning, and dryness of the pharynx. Excessive or improper use of the voice is the usual exciting cause. These varicose veins are most common between twenty-five and forty-five, and are rare in children. They sometimes appear at the change of life in women, and constipation and obstruction of the circulation in the liver are important factors in their production. When present, their destruction by means of the galvanic cautery gives excellent results.

THE SOFT PALATE

The soft palate, with its projecting uvula, may be injured or inflamed, and often shares in severe inflammations of the faucial tonsils, especially in quinsy. In the latter condition, the swelling of the soft palate may be so great as to push the uvula over to the opposite side.

It is often thickened from chronic inflammation due to the irritation of secretions and discharges coming down from the back of the nose and nasopharynx, or from the general inflammation which occurs from over-smoking, improper use of the

voice, and in gouty people, especially in those who are the subjects of habitual constipation.

One of the best known conditions of the soft palate is that called *cleft-palate*, in which, owing to a defect of development, the parts do not join in the mid-line. This defect may extend into the hard palate to a variable extent, so that the child may be born with 'no roof to its mouth.' Indeed, the disturbance of development which occurs may be shown from a complete cleft-palate and double hare-lip to a mere forking of the uvula. The only complete cure of the more severe conditions in which the hard and soft palates, or the soft palate alone, are cleft is by operation. Treatment is demanded from the point of view of the defective speech which it engenders, and from the ease with which food may find its way into the nose through the cleft. Often the operation requires to be supplemented by careful lessons in articulation.

A condition that is sometimes very troublesome is that known as *elongated uvula* (Fig. 12). This can scarcely be called a disease, for it is rather a symptom of inflammation of the pharynx, especially of the naso-pharynx, and is often a part of the general chronic inflammatory thickening of the soft palate just mentioned.

The relaxed, pendulous condition of uvula, well seen in Fig. 12, is usually due to the continued irritation of discharge from the back of the nose, and from inflamed states of the pharynx. It may be long, thin, and pointed, hanging down so far that its end

is hidden by the back of the tongue, or it may be large and thick. In robust people, the increase in size may give rise to no symptoms at all, or



FIG. 12.—ELONGATED UVULA.

to mere occasional slight irritation, but in sensitive persons it induces a dry, spasmodic cough every time it touches the epiglottis or the base of the tongue. Such a cough is particularly noticeable when the patient lies down, because of the irritation of the pharynx caused by the end of the uvula falling back and

tickling it. Sometimes the irritation of a long uvula is sufficient to cause nausea and even vomiting, especially in the early morning.

Common sense will tell that the proper treatment of a long uvula is that of the condition which gives rise to it, but, in addition to this, it is not infrequently necessary to remove it, wholly or in part.

THE PHARYNX

The most common condition of the pharynx which may cause trouble is due to inflammation (*pharyn-*

gitis), and this may be acute or chronic. The former is usually a simple acute catarrh, due to 'colds.' It is within the experience of most people that an ordinary cold in the head often begins in the pharynx or naso-pharynx with a sense of heat, dryness, and tickling or scraping. When the inflammation is at all severe, this is accompanied by alteration in the quality of the voice, stiffness, and aching of the muscles of the neck, and a certain amount of pain on swallowing.

Chronic pharyngitis is a very common condition, especially in town-dwellers. It may be due to gout, to immoderate indulgence in smoking, to improper breathing (mouth breathing), to improper voice production, or to immoderate use of the voice ('clergyman's sore throat'), as in clergymen, singers, auctioneers, costermongers, etc., or to conditions of the nose accompanied by obstruction, or more or less continuous irritating secretions. The gouty throat occurs in persons who, having a gouty tendency, are of sedentary occupation and constipated habit. In over-smoking, the irritation of the hot smoke and the volatile bodies therein acts directly upon the pharynx. In improper voice production and over-use of the voice the muscles of the pharynx become over-strained, whilst in mouth breathing the incoming air cannot be purged of its impurities, moistened, or warmed, and thus acts as a continual direct irritant. Nasal conditions act by causing mouth breathing or by the continual flow of irritating secretions over the pharyngeal mucous membrane.

Sometimes, in chronic pharyngitis, small, round, raised bodies appear, known as granules ('granular pharyngitis'). These are enlarged masses of tissue, similar to the tissue of the tonsils, embedded in the pharyngeal lining membrane. In such cases an irritable, dry cough is a prominent symptom. They are usually easily destroyed by touching with the electric cautery, one of the few uses of this instrument in throat and nose surgery.

In other cases, pharyngitis is accompanied by thickening of the tissues at the sides of the pharynx, and of the soft palate and uvula.

Symptoms are not always present in chronic pharyngitis, but, when the reverse is the case, the complaint is sometimes made of a sensation as if a foreign body were present. Perhaps the most frequent trouble is cough, irritating, dry, and hacking, with a desire to spit without the satisfaction of much expectoration. Hoarseness is sometimes present, due to spasm of the muscles of the pharynx. Foul breath is not infrequent, and most of these symptoms are accompanied by constipation and a more or less disordered digestion.

When symptoms such as those just described occur, the nose and mouth should be overhauled by a doctor to search for a cause, and it is only by treatment of the cause, when found, that a good result can be attained. The mere use of gargles, lozenges, paints, and the like, is an unsatisfactory way of seeking temporary relief by treatment of what is only an effect.

CHAPTER V

THE ORGAN OF VOICE AND THE TROUBLES WHICH MAY AFFECT IT

THE larynx being the organ of voice, the most prominent symptom of the disorders which affect it is *alteration of the voice*, varying from slight huskiness or hoarseness, or painful speaking (*dysphonia*), to complete loss of voice (*aphonia*). It is well at once to warn the reader that loss of voice in any degree is a symptom not to be trifled with, since it may be due to any condition, from a simple cold to a malignant growth, and neglect may mean the waste of very valuable time and opportunity.

The most important disorders affecting the larynx may be discussed under four heads: inflammation, paralysis, tumours, and foreign bodies.

INFLAMMATION OF THE LARYNX (LARYNGITIS)

Inflammations of the larynx may be acute or chronic, due to simple causes, or to severe and serious diseases, such as syphilis, tubercle, or cancer.

Acute catarrh of the larynx (*acute laryngitis*) is characterized by hoarseness, or loss of voice, and pain on speaking. The commonest cause is 'cold,'

but it may occur in the course of such infectious fevers as scarlatina and measles, from syphilis, cancer, or tubercle. The occurrence of diseases in other parts of the upper air passages may not only predispose to acute laryngitis, but may directly cause it. This is more particularly true of diseases of the accessory cavities of the nose, nasal obstruction, and infective tonsillitis. Indeed, it may be taken generally that inflammation in one part of the upper air passages tends to extend to adjacent parts. Such extension may be by continuity of tissue, as well as by the simultaneous exposure of the various structures in the passages to the same irritation. The tendency is for the inflammation to extend downwards, as demonstrated in the common cold, which, beginning in the nose and naso-pharynx, passes down to the larynx, and may even pass on to bronchial catarrh.

Extension is not always, however, due to continuity, since a laryngitis may result from the continual dropping of irritating secretions from the nose or naso-pharynx on to or into the upper opening of the larynx and so infecting it. In nasal obstruction the functions of the nose, by the due exercise of which the incoming air is warmed, moistened, and cleansed of impurities, are impaired, so that the lining membrane of the pharynx and larynx is subjected to air which, cold, dry, and laden with foreign material, is irritating and lowers its resistance.

Unhealthy conditions of environment also tend to inflammation of the larynx, especially the presence

of noxious gases in the atmosphere (as in chemical laboratories, factories, and the like), bad ventilation, exposure of the body and the feet, and abuse of the voice. In the first named, the air breathed is directly irritating; in the second, the vitality of the parts is lowered by the respiration of air which is not only impure but deficient in oxygen. Such lowering of vitality is not only local but general, and puts the patient in a favourable condition for the attacks of microbes. Undue exposure of the body (especially of the feet), by causing the loss of considerable quantities of body heat, upsets the balance of the circulatory arrangements; and it may be pointed out that an excessive amount of clothing is, in this respect, as prejudicial as too little. The abuse of the voice in singing and speaking excites inflammation of the larynx both by upsetting the circulatory balance and by mechanical irritation.

Another cause of laryngitis is the effects of injury from chemical fumes or foreign bodies.

Acute laryngitis is most common in young adults, and in the spring and autumn.

The symptoms of acute laryngitis are chiefly alterations in the voice, which may be hoarse in varying degree to complete loss. These alterations are due to swelling of the vocal cords and adjacent parts, and to paralysis of the special muscles in the larynx from inflammation. Speaking is an effort and is usually painful, and breathing may be laboured, especially if the swelling in the larynx is marked. Cough is common, and may be soft and husky, or

harsh and spasmodic. *Rest from speaking* is very essential during an attack of acute laryngitis.

In children, acute laryngitis ('*false croup*') is often characterized by spasmodic, croupy cough, with fits of suffocation. The presence of adenoids in children, from which irritating secretions may easily reach the larynx, as they have but a very little way to go, is a frequent cause of acute laryngitis. Moreover, the relative and absolute smallness of the opening of the child's larynx makes the disease much more serious, because it increases the danger of suffocation. The symptoms are much the same as in the adult, but are usually much more marked. Breathing becomes greatly embarrassed, especially towards evening, and a dry cough makes its appearance, not usually enough to prevent sleep. Usually about midnight the child gets a sudden spasm, with loud, harsh cough, and difficulty in getting the breath, so that the face becomes blue and there may be imminent danger of death from suffocation. The children who suffer from recurrent attacks such as have just been described are practically always adenoid children.

MEMBRANOUS LARYNGITIS AND DIPHTHERIA

In membranous laryngitis the inflammation of the larynx is characterized by the formation of a false membrane. Opinions differ as to the identity or not of this disease with true diphtheria, but evidence tends to show that they are two diseases, one due

to infection from the diphtheria bacillus, the other (*croup*) to one from other micro-organisms. In the latter the causes are microbic, or chemical and mechanical irritants. It may occur from exposure to damp and cold, or may follow scarlet fever, small-pox, measles, etc. The symptoms are much the same as those of simple acute laryngitis. There is spasm and cough, and breathing becomes very difficult and crowing, owing to the obstruction from swelling and the new-formed membrane. The disease is progressive, and not, as in simple acute laryngitis, simply spasmodic, so that the child may be in a condition of imminent danger from asphyxia.

Diphtheria, on the other hand, is an acute infectious disease comparable to scarlet fever and measles, characterized by the presence of a special microbe, the diphtheria bacillus. It is directly infectious, and may be caught by breathing the atmosphere round the patient, by inhaling his breath, by receiving his secretions when he coughs or sneezes, or by kissing. Infection may also be conveyed by the hair or fur of domestic animal pets (dogs, cats, rabbits, etc.), by towels, food utensils, clothing, and the like, and by food, especially milk.

The disease is characterized by the formation of membrane, which may be found in the nose, pharynx, tonsils, palate, mouth, lips, larynx, wind-pipe, or even in the ear. In 75 per cent. of cases it is above the larynx, in 17 per cent. in the larynx itself. The disease usually begins with lassitude, discomfort, sore throat, difficulty in swallowing, and more or

less hoarseness. Thick, yellowish membrane forms on one or more of the parts mentioned above, leaving a raw and bleeding surface if removed. Breathing is impeded, more or less seriously, and the patient speedily becomes exhausted. Later in the disease, paralysis may occur of the soft palate and pharynx, so that swallowing is disturbed and liquid food finds its way into the nose, whilst the voice alters in quality and becomes 'nasal.' Other paralyses, as of the muscles of the eye, may also occur.

Diphtheria is a terrible disease, and has been responsible for the slaughter of many innocents. Hence the importance of the prevention of its spread cannot be exaggerated. The Rules of the Health Department of the City of New York contain some useful regulations to this end. The ways in which the disease may be disseminated, as already given above, should be borne in mind. The kissing of a child, for instance, however deep the affection which prompts it, should be avoided, for many people, including a beloved princess, have contracted the disease and died therefrom through such a 'kiss of death.'

At the present day, diphtheria antitoxin has materially reduced the mortality of the disease. In 1888 the percentage mortality in diphtheria was 59·3, in 1912 it was 6·2. Up to 1894, when antitoxin was first introduced into practice, the percentage was never less than 29, and from that time it has steadily decreased, the last double figure being in 1904, when it was 10 per cent. Persons who have risked

diphtheria infection should at once receive an injection of antitoxin to render them immune. The introduction of antitoxin has greatly reduced, among other things, the necessity for opening the wind-pipe (*tracheotomy*).

ACUTE SWELLING OF THE LARYNX (ŒDEMA OF THE LARYNX)

Sometimes an acute inflammation of the larynx occurs with so much swelling of its loose tissues that very great obstruction occurs suddenly, so that the sufferer is in imminent danger of suffocation. This condition is called 'œdema of the larynx,' and is one necessitating prompt treatment.

The causes are mostly those of injury, such as the entry of irritating liquids into the voice-box, the presence of foreign bodies, or the inhalation of scalding steam. The last named is not an uncommon one in young children, who, if left alone, have, being thirsty, sucked the spout of the kettle.

It may also occur in other diseases of the larynx, such as tubercle, syphilis, abscess, etc., and it may appear in the course of Bright's disease, diabetes, or valvular heart disease.

The onset is usually sudden, with loss of voice and acute distress from imminent suffocation, and, unless relief is prompt, death may occur from asphyxia. Pain and cough are absent.

It must be insisted that so serious a condition requires immediate skilled treatment, and may,

indeed, require the opening of the wind-pipe below the larynx (*tracheotomy*).

CHRONIC LARYNGITIS

Chronic inflammation of the larynx is usually a sequel to acute laryngitis, or to inflammation of the nose, naso-pharynx, or tonsils. It is a matter of doubt whether it ever occurs as a *primary* condition, except from improper use of the voice, for it is rare to see cases which are not associated with diseases occurring earlier higher up in the air passages.

It may be due, therefore, to improper preparation of the incoming air on account of disease of the nose and its accessory cavities (adenoids, deformities of the septum, polypi, enlarged turbinates, etc.); to continued irritation of the larynx in mouth breathing, liver and digestive disorders; to congestion in heart disease, or from the pressure of enlarged glands or tumours; to smoking, inhalation of dust, excessive use of alcohol, syphilis, and violent use of the voice; and to climatic conditions, such as damp, cold weather, and dry, dusty days, especially if breathing is carried on through the mouth. It is more common in men than in women, and in old people.

The larynx becomes congested and chronically inflamed, with congestion and thickening of the vocal cords. The voice is husky and may be lost (*aphonia*) from time to time, or permanently. It is easily tired, and there is a sensation of increased secretions, causing a frequent desire to 'clear the

throat.' In early stages the condition can be relieved, especially when due to excessive use of tobacco or alcohol, to improper voice production, or to easily remedied disease of the nose.

Singers' Nodes.—Sometimes, in singers and public speakers, chronic laryngitis is characterized by the formation of small swellings or 'nodes' on one or both vocal cords. These are mostly due to faulty methods of breathing and voice production. Singers or speakers thus suffering find themselves unable to strike the tone desired, especially in the middle register. Naturally, the most essential treatment in such cases is to remedy the defects present in the method of breathing and voice production.

Dry Laryngitis is another form of chronic inflammation usually following dry conditions of the nose, such as ozæna (see page 24). There is a pricking, burning sensation in the larynx, especially after using the voice, with asthmatic, suffocative attacks during the night. A hoarse, spasmodic cough is present, by which attempt is made to get rid of the crusts which form in the pharynx and larynx.

NERVOUS CONDITIONS OF THE LARYNX

These may be described briefly as *spasm*, and *paralysis*, and affect the small muscles which move the vocal cords. The violent action of these muscles may so close the aperture between the vocal cords as to prevent the entrance of air and place the patient in danger of suffocation.

Spasm.—This may result from irritation arising from diseased conditions in the brain (as locomotor ataxy, tetanus, etc.), from irritation of the trunk of the nerve going to the chief muscles of the larynx, or reflexly from irritation of parts outside (and even remote from) the larynx.

Owing to the fact that the nerve going to the laryngeal muscles passes down into the chest and hooks round the great artery therein (*aorta*) on the left side, and round one of the other great arteries on the right, it may be irritated or subjected to serious pressure by aneurisms of these vessels, or by tumours in the lower part of the neck or in the chest, or implicated in cancers of the food passage (*oesophagus*).

Reflex spasm may occur from irritation of the larynx itself, of the pharynx, or of the opening from the mouth into the pharynx (*fauces*), etc. In highly sensitive children, irritation in remote parts of the body may cause spasm of the muscles which bring the vocal cords together. This irritation is not infrequently intestinal, from worms, or from constipation.

Paralysis of some or all of the muscles of the larynx may be due to causes in the brain, to pressure of an aneurism or a tumour, to tuberculosis, cancer, or syphilis, or to neurasthenia ('hysterical paralysis,' causing loss of voice, or 'hysterical aphonia'). The earliest symptom of tuberculosis of the larynx is sometimes loss of voice, due to the small laryngeal muscles being attacked by that disease.

TUMOURS OF THE LARYNX

The new growths which affect the larynx may be considered in two classes, *benign* and *malignant*. The former are characterized by absence of pain, and the fact that they do not recur after removal; the latter by pain, recurrence after removal, and the destructive processes in which they result.

The *benign* growths most commonly met with are fibrous tumours and papillomata (or warty growths). The latter are most common in children, and may occur after measles. They give rise to hoarseness and loss of voice, which may be transitory or constant. They may cause severe distress in breathing, which may amount to suffocation so serious as to need prompt treatment to prevent death from asphyxia.

The most common *malignant* growth of the larynx is cancer. This may commence in the larynx itself (*intrinsic cancer*), or at its upper opening.

Since the only hope in this very terrible disease, so far as present knowledge goes, lies in its early discovery and removal, it is well that the first signs suggestive of its presence should be known. They are chiefly: continued hoarseness without cough and without other known cause, and sharp and sudden pains in the larynx, ear, or pharynx. The usual age for cancer is forty years and upwards, although it may occur in much younger persons. Hence the paramount necessity for seeking early advice when this symptom of continued hoarseness without other known cause and without cough

occurs in a person over forty. If the cause be cancer, the earlier advice is sought the better is the chance of avoiding a terrible death. The best results of removal of these growths are in those which are 'intrinsic,' as such cancers, efficiently removed, are less liable to recur. The result of a cancer of the larynx which is neglected until it is too late for removal by operation is a distressing and painful death.

FOREIGN BODIES IN THE LARYNX

The lodgment of a foreign body in the larynx may occur to any one, but is most common in infants and young children, owing to their instinctive desire to test all substances by placing them in the mouth. Crying, coughing, or laughing when the mouth contains some foreign body, may result in drawing it involuntarily into the lower air passages, and, as the larynx is the narrowest part, it is most likely to lodge there. Such foreign bodies may be of almost any nature, from particles of food to coins, marbles, portions of toys, safety pins, false teeth, etc. The dangerous habit of sleeping with an artificial denture in the mouth has occasioned more than one fatality. Small tooth plates may become lodged in the larynx itself or in the gullet.

The disturbance caused by the lodgment of a foreign body in the larynx is usually immediate. There is suddenly obstructed breathing, with laryngeal irritation going on to violent choking and suffocative attack. A small body may pass

down further into the air passages and the symptoms subside, to return after a time. On one occasion in the author's experience, a thin fragment of celluloid from the sail of a toy wind-mill became lodged in the larynx on a Wednesday, with a choking attack, but further symptoms subsided until the Saturday night, when the swelling caused by the presence of the body closed the air-way sufficiently to cause a return of the choking to a much more alarming extent, necessitating tracheotomy.

When a foreign body passes further down, it may later cause pneumonia or abscess of the lung. Cases are on record, however, in which bodies have remained lodged in the lower parts of the wind-pipe for years. This is not, one need hardly say, an argument for not removing them.

When a foreign body enters the larynx, skilled help should at once be sent for. Meanwhile, it must be pointed out that it is dangerous to follow the popular practice of thumping the victim's back, as it may have an effect the reverse of that desired and not cause the body to be expelled, but inspired deeper into the air passages. It is better to invert the patient, and, if he appears to be in imminent danger of suffocation, to open the wind-pipe just below the larynx with a pen-knife.

CHAPTER VI

THE CARE OF THE VOICE IN SINGING AND SPEAKING

IN this chapter some special mention must be made as to the care of the voice, since many good voices, both in singing and in speaking, are ruined for want of a little knowledge. The term 'vocal abuse' was introduced in the year 1894 by Professor Castex, of Paris, to indicate that bad management of the organ of voice which results from persisting in such irregular exercise of its function as to exaggerate, impede, alter, or divert its normal physiology. A short description of the causes which lead to this vocal abuse will show more clearly than by any other method the way in which the voice should be cared for, and it may be mentioned at once that orators and speakers are subject to nearly the same causes of fatigue as are singers.

The first condition to consider in dealing with the voice is that in which the vocal apparatus, which includes lungs, larynx, pharynx, nose, and mouth, is altered or malformed. This includes all sorts of conditions, from such serious deformity of the chest as may result from rickets to a simple cold. It is neither possible nor expedient to enter fully into these conditions, but emphasis must be laid upon

the changes which may attack the upper resonance chambers and alter the quality of the voice. These changes are especially the different forms of nasal obstruction, which give to the voice a nasal character and impede the breathing function. Such obstructions and the pharyngitis which often results from them have already been considered. Enlargement of the tonsils muffles the voice by partially fixing the soft palate, badly arranged teeth upset articulation. Bad conditions of hygiene, such as the abuse of tobacco and alcohol, exposure to dust, and too tight lacing of the corset, also injuriously affect the voice.

Next come the conditions which may be grouped as anatomical disproportions and want of harmony of the different parts of the organ of voice. The first of these is the association of small, short, and delicate vocal cords (such as are usually seen in the soprano and the light tenor) with a too well-developed chest. Here, as it were, the bellows is too strong for the reed and the vocal cords may be injured by excessive and exaggerated blasts of air. In such cases the functional adaptation of the respiration to the vocal cords, the exact accommodation of the tension of the lungs to the needs of the larynx, should occupy the constant attention of the teacher of singing and his pupil.

The converse of the above is the case in which the vocal cords are strong and resistant whilst the chest is under-developed—feeble bellows and strong reed. The dangers are less grave, since the effects

are less immediate, but, in such cases, if the chest register is used too largely, the breathing apparatus becomes overworked and the condition known as emphysema results. The obvious remedy is to develop the breathing by methodical and regular exercises.

A common abuse of the voice occurs when the demand made upon the vocal apparatus is such as, from want of organic aptitude, it cannot possibly fulfil. It is universal knowledge that singing voices are classified into certain groups—tenors, basses, baritones, sopranos, mezzos, etc. For a singer normally and safely to answer to the special qualities of voice in the class to which he belongs, it is necessary for him to possess such a vocal organ as is appropriate to the demands made upon it; that is to say, the singer must not go out of his register. As Morell Mackenzie said: 'A baritone can no more be transformed into a tenor than a blackbird into a grasshopper.' Many voices have been ruined by the mistaken idea that they can sing habitually out of their normal register. An historical case in point is that of the celebrated Jenny Lind, who, taught first at Stockholm by Beig and Croelius, appeared in 1837 as a high soprano. Four years later she came to Paris, with a voice already much fatigued. Garcia recognized that the organ had been overstrained in its high notes and brought it to its natural limits, so that, in 1845, she was able to make the triumph at Berlin in *Norma* which was the commencement of her great career.

There is always a danger in empirical classification, and it cannot be expected that every voice can be grouped according to some hard and fast rule. It is manifestly absurd to expect similar results and similar compass in every voice which has been put into one category. Unfortunately, tradition has led composers more or less to expect every tenor, every soprano, every contralto, to be able to utter the same number of notes because they have been classed as tenors, sopranos, contraltos. Hence teachers often contribute to the dire effects of vocal mismanagement by trying to make their pupils' voices fit the frame of one or other class instead of developing their natural powers. The range of voice may fit the key-board assigned to it, it may even exceed it, too often it falls short of it. The singer who wishes to take care of his vocal apparatus will limit his repertoire to parts which are adapted to his range of voice.

Defective methods of breathing form another cause of vocal abuse. An enormous quantity of nonsense and a certain amount of sense has been written upon breathing in singing and speaking. The real object in regulating the breathing in singing is to educate the different types of respiration so as to obtain the maximum replenishment of air with a minimum of effort. This does not need destructive methods of education by the alteration of a natural type to one that is foreign to the singer. The cardinal point in the art of singing is the regulation of the tension, the gradual, progressive, and reasonable distribution

of the air according to the necessities of each case. The whole may be summed up in one sentence—whilst it is necessary to remedy natural incapacities, proper breathing during singing is not a question of adopting some particular respiratory type, but of breathing naturally.

In conclusion, the chief causes of voice deterioration in singers and speakers may be summarized as follows :

1. Imperfect general health. Feeble persons cannot develop or maintain a good voice, and, being of low vitality, are liable to repeated attacks of catarrh.

2. Singing or speaking during an attack of laryngitis, which may permanently ruin the voice. Singing or excessive speaking during the progress of an ordinary cold is also extremely bad for the voice, since it means the use of the vocal cords and all the accessories of the voice apparatus during a time when some or all of them are inflamed and should be kept at rest. None would willingly walk or run with an acutely inflamed knee.

3. Improper method of voice production. This is, probably, the commonest cause of voice injury. It causes needless strain of the muscles concerned in producing the voice and so interferes with their exact adjustment, causing them to contract too forcibly, stiffening their action and preventing delicate adjustments, so that, as gymnasts put it, the larynx and pharynx become 'muscle bound.' As a result, there is aching of the throat and neck after singing or speaking, with, sooner or later, chronic pharyngitis.

CHAPTER VII

HOW DEAFNESS IS BROUGHT ABOUT

AS indicated in the second chapter, the ear is conveniently divided anatomically into three parts, outer, middle and inner; its diseases may, therefore, be with equal convenience discussed in like manner. At the same time, it must be remembered that, the anatomical division being at the best an arbitrary one, the three parts may and often do overlap in disease.

Before discussing the different disorders which may affect the ear, a few words are necessary as to the chief symptoms to which ear disease may give rise. These are five, namely, deafness, noises in the ear or head, pain, discharge, and giddiness or vertigo. The first of these may vary from very slight hardness of hearing, scarcely inconvenient, to its complete loss ('stone deafness'). It may be pointed out that normal hearing differs in a limited degree in different people; that is to say, some people are *physiologically* less acute of hearing than are others. Deafness may be divided roughly into two kinds: *obstructive deafness* (external and middle-ear deafness), due to disorders of those portions of the ear which conduct the sound to the auditory nerve endings; and *nerve*

deafness (inner-ear deafness), due to disease of these nerve endings themselves, or of the nerve trunk or of that part of the brain concerned with sound perception and interpretation. These two forms of deafness are characterized: the one—obstructive deafness—by loss of hearing for low tones; the other—nerve deafness—by loss of hearing for high tones.

Noises in the head or ear (*tinnitus*) are due to irritation of the auditory nerve. Just as in an ordinary sensory nerve irritation gives rise to pain, so in nerves which have to do with the special senses, like the nerve of sight and the nerve of hearing, irritation gives rise to sensations characteristic of their special function. Thus irritation of the optic nerve causes a sensation of flashes of light, of the auditory nerve a sensation of sound. Hence disease of the ear irritating the auditory nerve endings causes noises in the ears or head which may vary from slight buzzing to loud, continuous, complicated noises, or even to words and sentences. These may be of no consequence, as in the slight, transitory ringing (popularly termed 'news bells'), or may be a continual source of acute distress which has been known even to drive the sufferer to suicide. In the insane, noises in the ear often form an important basis of hallucinations suggesting dangerous acts, suicidal and homicidal.

Pain, as an indication of ear disease, may be manifested as 'earache,' pain round the ear, and headache. It may vary from a slight dull aching to pain of agonizing intensity.

Discharge from the ear is always a symptom of serious import. With the exception of a few cases of discharge arising in the outer passage, it indicates inflammation of the cavity of the tympanum. When composed of matter (pus) it means an abscess of that part, and, as will be seen later, is a real danger signal. As a celebrated surgeon once remarked, it is better to carry a charge of dynamite in the pocket than a drop of pus in the ear.

Giddiness, or vertigo, is another important symptom, indicating irritation or disease of the semicircular canals of the internal ear.

DISEASES OF THE OUTER EAR

The most common troubles of the outer ear are due to inflammation, accumulations of ear wax (*cerumen*), and foreign bodies in the outer passage.

Attacks of inflammation are predisposed to by picking or scratching the passage with pins or other instruments. When the inflammation affects the whole passage, there is swelling, discharge, and moderate pain, without any very marked deafness. Sometimes the inflammation is confined to small areas, forming *boils*. A boil in the passage is one of the most acutely painful affections of the ear. Boils occur in persons run down in health, or in those living in houses with defective drainage. They are generally preceded by intense itching, followed by pain, which becomes more and more intense until the boil bursts. Pain is always worse

at night, causing want of sleep, which intensifies the suffering of the patient. These boils are usually the work of one of the special microbes of purulent inflammation, and, as the discharge from one boil readily infects the skin in its neighbourhood, they are especially liable to occur in repeated crops. Accumulations of dead skin or wax form an excellent breeding ground for these microbes, and, if treatment is given up too soon, or if the passage is not kept absolutely clean, fresh boils will appear. Hence treatment should always be persevered in for at least a week after all symptoms have disappeared.

Accumulations of wax, a common cause of deafness, may block the passage and give rise to marked deafness, easily relieved by their removal. The glands which secrete the ear wax, or *cerumen*, are situated in the outer half of the passage, and are a modification of those glands of the skin which secrete the perspiration. A large plug of wax may exist for some time, but so long as a chink remains for the entry of sound waves, hearing is not impaired. Sudden increase of deafness may occur from swelling of the plug of wax by the entry of water into the ear. Complete obstruction of the passage by wax results in deafness with a dull, stupid feeling, and, if the plug presses upon the drum-head, there may be pain and noises in the ear. The condition may be relieved quickly by syringing the ear, but, unless the syringing is done expertly, the plug of wax may be driven further into the passage and the trouble accentuated. Hot water is the best fluid to use, as

it is a solvent of *cerumen*, but everything depends upon *how* the syringing is done.

Foreign Bodies.—The outer passage of the ear is a common place for the lodgment of foreign bodies. They may be put in intentionally (usually by children), may enter accidentally, or by their own effort in the case of flies, fleas, cockroaches and other insects. Children are very fond of putting things into both ear and nose. An infinite variety of bodies have been found in the ear—peas, beans, fruit stones, seeds, pebbles, beads, buttons, pins, fragments of bread, cotton wool, bits of wood or paper, flies, fleas, cockroaches, maggots, etc. Plugs of cotton wool are very common, having been put in for protection or when there is discharge, allowed to become too deeply placed and forgotten. Flies may be attracted by the odour of discharge and may lay their eggs in the ear passage, which eggs may develop into maggots. Medical aid should be invoked to remove foreign bodies, as inexpert attempts may result in serious damage. Many foreign bodies can be removed by careful syringing, but this method should not be used in the case of such objects as bread, peas, beans, and the like, which can absorb moisture and swell, so becoming more firmly fixed. Instruments should on no account be used for the removal of foreign bodies except by expert hands. Insects may be floated out with warm oil, or killed by the fumes of chloroform placed in a cup over which the ear is held.

DISEASES OF THE MIDDLE EAR

The deafness due to affections of the middle ear comprises about eighty to ninety per cent. of all forms of deafness, and ninety per cent. of cases of middle-ear deafness originate in inflammatory conditions of the naso-pharynx, with extension to the ear through the Eustachian tube.

It cannot be too strongly insisted that in no other field of preventive medicine is there better opportunity than in the prevention of chronic middle-ear disease and its deafness.

The diseases of the middle ear which chiefly claim attention are suppuration and catarrh; that is to say, inflammation with and without the formation of pus.

Middle-ear suppuration, or inflammation in the cavity of the tympanum, with the formation of matter or pus (practically middle-ear abscess), must be taken first, since *all and every suppuration of the middle ear is a serious menace not only to hearing, but to life*, and the majority of such cases are amenable to timely and proper treatment. No case in which there is a discharge of matter from the ear should be neglected, either in childhood or adult life, but especially in childhood, for, as the child is father to the man, so is discharge in the former often the cause of death in the latter.

Middle-ear suppuration may be the result of one of the infectious diseases, and of these scarlet fever, measles, diphtheria, and whooping cough are the greatest offenders. In all of these the trouble

usually starts by extension of septic inflammation in the naso-pharynx; in whooping cough by the forcing of infective material into the Eustachian tubes during the paroxysmal cough. In scarlet fever and diphtheria, the disease may start also as a septic inflammation of the temporal bone itself, especially of that portion of it known as the mastoid, and this form is very virulent, destructive, and difficult to treat, save by operation. Influenza is also a source of very serious acute middle-ear abscess, and nearly always needs very prompt treatment to save hearing and prevent grave complications. But the majority of cases of middle-ear suppuration start in the naso-pharynx, in children from adenoids, in adults from naso-pharyngeal inflammation, and the reader is referred to Chapter III. (page 20) for information as to how this comes about. Hence the great importance in treatment of attacking the disease, not only through the outer passage but through its original path of infection, viz., the nose and the space behind it.

Nearly all cases of middle-ear suppuration start as an acute inflammation of the Eustachian tube and tympanum. The inflammation and, later, the formation of matter shut up in a bony cavity with unyielding walls, causes pain, only relieved by perforation of the drum-head and the discharge of the contained accumulation. It is at this early stage that an incision in the drum-head, combined with active treatment of the nose and naso-pharynx, is most likely to bring about relief and cure, by

relieving tension, by draining the middle ear, and by attacking the cause. Surgical incisions in the drum-head heal rapidly and leave little or no damage, so that a dangerous condition is stopped and hearing preserved. *Timely and efficient treatment is everything*; risk lies in temporizing until the drum-head perforates by itself.

Cases which are neglected pass on to chronic suppuration, in which the discharge is kept up by repeated reinfection through the Eustachian tube and by bad conditions in the tympanic cavity. These latter are chiefly due to anatomical reasons, which result in a badly-drained abscess deep in the bone; partly to ulceration of the bony walls of the tympanum. It is then that complications begin. If the relations of the middle ear be considered—the mastoid antrum behind, with its narrow passage of entry from the tympanum; the thin roof above, separating it from the brain cavity by a partition scarcely thicker than paper; the floor below with its big vein underneath; the facial nerve coursing through the inner wall only separated by a delicate plate of bone (often incompletè); and the labyrinth on the inner side—the occurrence of such serious complications as mastoid abscess, meningitis, brain abscess, septic clotting in the big vein, blood poisoning, facial paralysis and abscess in the labyrinth itself can be readily understood and, perhaps, realized. Besides these complications, all of which are serious and tend to be fatal, there may occur destruction of the ossicles and the formation of

polypus. Every one of these complications necessitates surgical treatment, mostly operative, of varying severity. Could there be any condition of body which calls more for prevention than cure? On the one hand is timely interference by appropriate and simple treatment leading to cure and preservation of hearing; on the other hand lies serious operation by which, too often, the important function of hearing has to be sacrificed to the saving of life. There is no need to go more into detail of the complications that may occur; there is every reason for impressing upon the reader the grave necessity for losing no time in seeking prompt and skilled treatment to save life and hearing. The greater number of cases of middle-ear suppuration met with in adults originate in childhood, so that it is to the child that attention must be given if such trouble is to be prevented. Indications as to the measures needed systematically to carry out this scheme of prevention will be given in Chapter VIII.

There are certain superstitions prevalent concerning discharge from the ear that must be mentioned here, because they require to be vigorously and ruthlessly combated. The first is that it is 'dangerous to stop a discharge.' This is a very old fallacy, the origin of which may be traced to Fallopius, who flourished from 1523 to 1562. This celebrated anatomist, whose name lives attached to several structures of which he was the original describer, first taught that a discharge of pus from the ear of a child should not be meddled with, as it was an

'effort of nature to throw morbid material out of the head through the ear'; the survival among the ignorant of this pernicious doctrine is responsible for many fatalities and much destruction of hearing. It was probably the cause of the untimely death of Francis II. of France, although, if we are to believe Balzac (*Sur Catherine de Médicis*), the great Ambroise Parré, with a learning in advance of his time, would have opened the royal mastoid had his brother surgeons permitted him.

Another fallacy is that the stoppage of a discharge is responsible for deafness. In chronic middle-ear suppuration it is often the fact that hearing is better whilst the discharge is flowing freely and worse when it apparently ceases. The word 'apparently' is used advisedly, because the real state of things is that hearing is less because the ear is full of discharge which is, for some reason, blocked up and unable to get out, the increased tension causing pain and headaches and increased deafness, which symptoms are relieved by the re-establishment of a free flow. The ignorant, who do not know this, naturally mistake cause for effect, and argue erroneously on that account that the pain, headache, and deafness are due to *absence* of discharge, and that it should, therefore, not be stopped. No doubt this fallacy has helped to keep alive the idea that it is dangerous to stop an ear discharge. Unfortunately, there appear still to exist a few doctors sufficiently ignorant to support it and their opinion is eagerly seized upon by those of the laity whose wishes it suits. Luckily for the

cause of prevention, these unscientific persons are rapidly dying out. At the risk of repetition, it must be emphatically insisted that all middle-ear suppurations are gravely dangerous.

Operations on the Mastoid.—Most people have heard of the ‘mastoid operation,’ but very few have a correct idea of what it means, and a few words explanatory of its aims and results will, therefore, be appropriate. Owing to the situation of the mastoid antrum inside the mastoid portion of the temporal bone, disease therein forms a grave and important complication of suppuration in the middle ear. The tympanum being in direct communication with the mastoid antrum, it is easy, in both acute and chronic abscess in the middle ear, for the purulent inflammation to find its way from the latter cavity into the former, and, owing to the anatomical arrangement of these cavities, once an abscess forms within the mastoid antrum, drainage becomes exceedingly difficult. Moreover, the roof of the antrum is a thin sheet of bone, continuous with that of the tympanum, and forming, with the membranes of the brain, but a frail separation from the brain cavity. Further, distant from the antrum but a very little way, lies a large vein within the skull (*lateral sinus*) which is directly continuous with the big jugular vein of the neck. Therefore, a person who is the subject of acute or chronic abscess in the mastoid antrum is always in danger of some such serious complication as meningitis, brain abscess, or infection of the vein and consequent blood poisoning.

The surgery of the mastoid process has made great strides during the past quarter of a century and has been the means of saving many lives. Originally intended merely as a means of draining the mastoid antrum, the mastoid operation has so developed as to be applicable, roughly speaking, in three fundamental conditions: acute abscess of the antrum, chronic middle-ear suppuration, and as a surgical pathway for dealing with such serious and often fatal conditions as brain abscess, meningitis, and clotting of the blood in the lateral sinus, all originating in suppuration in the middle ear and antrum.

Speaking generally, the mastoid operation may be divided into two primary forms, simple opening and draining of the mastoid antrum and the cells in the bone opening into it, and the so-called 'radical' operation. In the former, the skin behind the outer ear, or auricle, is cut through and the bone opened with chisel or gouge until the antrum is reached, all diseased bone being removed and thorough drainage established through the opening made behind the ear, the upper part of the operation wound usually being closed by stitches, and the antrum packed through the lower portion until it has healed from the deep parts. This form of the operation is almost entirely reserved for cases of acute abscess, and, as the middle ear itself remains practically untouched, such cases usually recover with little or no impairment of the hearing.

The 'radical' operation consists essentially in opening up the mastoid antrum through an incision

behind the outer ear either the same size as or somewhat larger than that employed for the simpler operation, and then removing a considerable part of the bony wall of the external ear passage, together with the drum-head and the two large ossicles (hammer and anvil), so that the whole of the tympanum and mastoid antrum are converted into one large and easily drained cavity. The whole of the wound behind the ear is closed by stitches, and the cavity treated through the natural opening. By grafting with skin or by the more slow process of allowing the skin of the outer passage to grow in until the cavity made by the operation is covered thereby, the operation aims at obtaining a smooth, skin-lined cavity which is no longer the seat of suppuration.

This radical operation is designed to deal with a chronic suppuration of the middle ear which has passed beyond cure by other methods, or to allow of free access to the ear so that the paths by which infection of the brain cavity, labyrinth, etc., can be efficiently attacked surgically. The result upon the hearing varies, some cases healing with the retention of a considerable part of that function, others being left with the hearing seriously impaired. Much depends, of course, upon the amount of destruction already present from disease, and some cases are of so serious a nature that the surgeon has to sacrifice the hearing to save life.

Middle-ear Catarrh.—As in middle-ear suppuration, the great majority of cases of middle-ear catarrh

commence in childhood, and adenoids are responsible for them. In young adults suffering from catarrhal deafness there is very frequently a history of recurrent attacks of earache in childhood, and in all these cases examination will show that there are evidences of the former presence of adenoids. With the arrival of puberty, these adenoids may have retrogressed, but they have left their mark either by chronic catarrh of the Eustachian tube, with more or less narrowing of its calibre, or by binding down of its opening by bands of adhesions. In later life, inflammation in the naso-pharynx, often due to causes in the nose, as described in Chapter III., may spread up the Eustachian tubes to the tympanic cavities. A typical history in such cases is as follows : a cold in the head causes temporary deafness, by blocking of the tubes, which passes off, leaving the hearing as good as before ; the colds are repeated, and the restoration of hearing is less perfect after each attack, until the patient finds himself left with a varying degree of permanent deafness in one or both ears. Often he is unaware of the amount of deafness in one ear until he discovers it accidentally, or by the implication of the other. In the earlier stages the loss of hearing is due to the temporary inflammatory blocking of the Eustachian tubes ; later on this blocking becomes permanent and extends into the tympanum, so that the ossicles become bound down by what is to all intents and purposes scar tissue, and unable freely to exercise their function.

The effect of Eustachian blocking is to disturb the balance of pressure in the tympanum, so that the air therein becomes partly absorbed, partly sucked out through the tube whenever swallowing occurs, and this air is not replaced, partly because the tube can no longer open properly and so ventilate the middle ear, and partly because the obstruction in the nose prevents sufficient air coming in. The pressure in the tympanum, therefore, becomes less, and the drum-head is depressed from the greater air pressure in the outer passage.

In the earlier stages this condition can be remedied by blowing air into the middle ear ('inflation'), either through a suitable tube (Eustachian catheter), or by means of the well-known Politzer air douche. Everybody knows that, by holding the nose and blowing out the cheeks with the lips closed, air can be forced into the ears, and many persons who suffer from Eustachian deafness practise this method of inflation because of the relief it gives. But it is imperative to warn the reader that *this method brings ultimate disaster if used too often*. Too frequent forcible inflation tends to weaken and stretch the drum-head, until it becomes so thin and lax that it sinks in and comes to lie upon the ossicles and hamper their movements, whereby the deafness is increased.

Middle-ear catarrh may be divided into two classes of cases, those in which the condition is limited almost entirely to the Eustachian tubes (Eustachian obstruction), and those in which it affects the whole tract,

including the tube and the tympanic cavity. Most cases of the former tend to end in the latter if allowed to progress without interference. In cases of chronic pharyngitis, the inflammation may slowly progress along the tube into the tympanum, so that the patient becomes slowly deaf by an insidious process which gradually extends until the middle ear is reduced to a condition in which the drum-head is thickened and the ossicles bound down (the stirrup bone being more or less fixed in the oval window), without marked or any Eustachian obstruction. These are the cases usually described as 'chronic dry catarrh.'

The chief symptoms of middle-ear catarrh are deafness, with a stuffy, stupid feeling of obstruction, and noises in the ears. These noises may be of a throbbing character, a high-pitched singing or hissing, or a surging hum like that experienced when a large sea-shell is placed over the ear. They are due to the increased tension present in the tympanum. In the later stages there occurs the well-known phenomenon of *hearing better in a noise*, such as when riding in a train or a rattling vehicle. This symptom has been variously explained, but the most usually held opinion is that it is probably due to stiffening of the joints of the ossicles, particularly of that between the stirrup bone and the oval window. Another and very likely explanation is, that low sounds being heard worse in middle-ear deafness, the surrounding noise is suppressed, whilst the speaker with normal hearing unconsciously raises his voice.

When the highly organized and delicate structure of the ear is considered, it must be patent to any one that the more a catarrhal inflammation is allowed to progress the less likelihood there is of cure, and that all such cases should be attacked as early as possible, in order to prevent their passing into an incurable stage. *Prevention is the only really efficient treatment, and it will be the treatment of the future.* It is not enough to rest content with attempts at restoring the passage of the Eustachian tube; the original causes at work must be sought for and attacked, adenoids removed, deformities of the septum and other nasal abnormalities corrected, so that the sufferer is restored to as normal a condition of nose and naso-pharynx as possible. In an early stage of catarrhal deafness, the correction of a bent septum, with the removal of the enlarged hind ends of the lower turbinates, will sometimes be sufficient to enable the ears to recover alone or with the help of moderate treatment.

Deafness should never be permitted to progress until it gets the upper hand. The first discovery that the hearing is affected is the time to seek efficient advice, and, because one, two, or even three attacks of deafness during a cold are recovered from, that is no reason for delay. The person who hugs himself with the idea that because such recovery has occurred once it must occur again is lulling himself into a false security which may have a rude awakening. The whole attitude that should be taken up is that *delays are dangerous.* Further,

when deafness of this kind begins, and there are definite manifestations of abnormal type in the nose and naso-pharynx, there is one course open and one course only, viz., the restoration to as normal condition of these parts as possible. It is of no use to temporize—to play with the case is worse than useless, and spells disaster. The importance of preventing it in the child by attention to the upper air passages has already been indicated.

OTOSCLEROSIS

There is a condition of slowly progressive deafness which has hitherto baffled the aural surgeon, and which has received the name of 'otosclerosis.' The chief points about this disorder are that it is hereditary, it commences at a comparatively early age of adult life, usually between twenty and thirty, is much more common in women than in men, and progresses in spite of treatment to a stage of very considerable deafness.

Anatomically, the condition (it is doubtful whether it is truly a disease or no) is characterized by a fixation of the stirrup bone by new-formed bony tissue, and by changes in the bone which immediately surrounds the labyrinth. A large percentage of cases shows that the condition is transmitted through the female and affects chiefly that sex. Often it first shows itself during pregnancy, and it is certain that the deafness is made worse by that condition. More recent research tends to show that many cases

are due to constitutional poisoning, chiefly through the digestive system from constipation. This opportunity may be taken to point out that so-called 'intestinal toxæmia' is responsible for an appreciable percentage of various forms of deafness and of disorders of the pharynx and nose. Such 'toxæmia' is generally due to habitual constipation.

The chief symptoms of otosclerosis are progressive deafness, noises in the ears, often of a distressing nature and frequently preceding the deafness, and the symptom of hearing better in a noise. The tympanum, drum-head, Eustachian tubes, and upper air passages are usually normal. At present further research is necessary for the elucidation of the mystery of otosclerosis, and the only hope of treatment lies in the early recognition of the disorder and the correction of any constitutional disturbance that may be found. In some cases the deafness progresses rapidly, baffling all attempts at amelioration; in others the condition may remain stationary for a year or more, to progress suddenly with renewed vigour.

DISEASES OF THE INNER EAR

The characteristic symptoms of disease affecting the inner ear containing the auditory nerve endings, or implicating the nerve itself, are severe deafness, with loss of perception for high tones, giddiness, and noises in the ear. The deafness, when severe, may be complete. Giddiness varies from slight swimminess to vertigo of such severity that the sufferer

cannot stand. The deafness may be due either to disease in the cochlea (see page 8) in which lie the nerve endings, or organ of Corti, or to disease of or pressure upon the trunk of the auditory nerve. The giddiness is caused by disease of the semi-circular canals (see page 8) or of that part of the auditory nerve which supplies them. Pressure on the nerve may occur from tumours inside the brain cavity.

Inflammation of the Labyrinth may be caused by injury, by the spreading to it of inflammation of the membranes of the brain (meningitis), or by extension from the middle ear. Injury will be dealt with later. Inflammation extending to the inner ear from meningitis is one of the most common causes of severe deafness in children, and will receive attention in Chapter VIII. Internal-ear deafness due to extension from the middle ear may arise from suppuration in that cavity, a serious complication requiring prompt surgical treatment. It may occur during acute suppuration, or as an acute complication in the course of chronic suppuration. It may be so severe as to result in death (*necrosis*) of the bony labyrinth, which may lie as a mass of dead bone in a bed of small polypi and pus.

In the later stages of chronic catarrh of the tympanum, a certain amount of inner-ear deafness sometimes occurs from gradual extension of the catarrhal inflammation through the round window.

Ménière's Disease is a serious condition of the inner ear in which marked deafness, noises in the ear, and

severe giddiness occur. It comes on suddenly, and as those three symptoms occur together in several different conditions, the term 'Ménière's disease' has been given to more than one form of inner-ear deafness. It should, however, be limited strictly to cases of sudden hæmorrhage into the labyrinth, which was the disorder originally described by Ménière. Such hæmorrhage may occur from disease of the arteries or in the course of certain serious constitutional diseases.

Boilermakers' Deafness.—When the ear is subjected to frequent slight concussions, lasting over a long period, as in boilermakers, sportsmen, artillerymen, range superintendents, those employed in machinery shops, and the like, a slow, chronic deafness occurs which is usually known by the above name. It is an insidious form of deafness, and is best prevented by attempts to reduce the operation of the concussion by stopping the outer ear passage or holding some substance, such as india-rubber, between the teeth.

Drug Deafness.—Certain drugs cause deafness of inner-ear type by their poisonous effects. Quinine, salicylic acid and its derivatives (salicylate of soda, aspirin), and, more rarely, tobacco, are the drugs most often responsible.

Senile Deafness.—With advancing age, the sense of hearing often suffers in common with the other senses. As a matter of fact, we have normally a greater range of hearing than is required in civilized life, and the acuteness for high tones begins to

diminish at about forty years of age or soon after. Probably, if man had to depend upon the sharpness of his hearing for his existence and had to hunt his daily meal before he could obtain it, he would longer retain his range of hearing.

The gradual loss of hearing with the advance of age is degenerative. It is well known that some persons retain their senses longer than others, and this probably depends largely upon the integrity of the circulation. Where the small arteries degenerate early, the senses are likely to suffer because they are less well supplied with blood. Anything, therefore, that tends to cause degeneration of the arteries will predispose to senile deafness, and the chronic poisoning which occurs in disorders of the digestive apparatus, of which habitual constipation is the most frequent, has an important influence thereon.

A few special conditions require to be mentioned before concluding this chapter.

Tuberculosis of the Ear.—This is a serious disease, especially in children. It may occur during consumption in adults, as a part of the tuberculous infection. In children it may begin as a tuberculosis of the mastoid bone, or in the middle ear. In the latter case, it arises by infection through the Eustachian tube, probably by the regurgitation of infected food from the stomach, especially milk. Tuberculosis of the ear in childhood causes great destruction of the organ of hearing, and is responsible for many deaths in infancy. It is characterized by

its painless nature. Mastoid disease, polypi, and facial paralysis occur early, and the ear rapidly becomes disorganized. Hence radical and sometimes repeated operations become necessary to save life. Tuberculous meningitis causes an appreciable number of cases of inner-ear deafness.

Syphilis.—This terrible disease, the ‘white scourge,’ often causes severe and incurable deafness, especially in innocent children born infected. It is the only disease which links together deaf birth and the deafness which is acquired after birth, also deafness in the parent and deafness in the offspring. Dr. Kerr Love, of Glasgow, has shown that an appreciable percentage of children born deaf owe their condition to this disease. In about seven per cent. of children who become deaf after birth the same destructive cause is at work. Before birth, the deafness is due to meningitis, and the same condition, or a specific inflammation of the inner ear, occurs in childhood. With the deafness often goes blindness. The only hope in these cases, and that is sometimes a slender one, is early and energetic treatment.

Mumps occasionally causes severe inner-ear deafness, and, although this complication of the disease is rare, it should be widely known, for, unless the deafness is caught very early and promptly treated, it is incurable.

Injuries of the Ear may affect any part of the organ of hearing. Blows upon the auricle sometimes cause blood tumours in its substance, the results of which leave a permanent and unsightly deformity

These blood extravasations occur especially in boxers and footballers, and are particularly liable to happen in the insane. Rupture of the drum-head may result from injury by hairpins or other instruments thrust into the outer passage accidentally or by design ; it may also occur indirectly by blows or falls on the side of the head, or by explosions near the ear, or by sudden increased pressure from the inside, through the Eustachian tube, from too forcible inflation of the tympanum during sneezing or violent blowing of the nose. When a rupture of the drum-head occurs, there is sudden deafness and ringing in the ear, often with a sensation of a small explosion in the head, sometimes with bleeding from the ear. The great point to be remembered about these injuries is that a rupture of the drum-head usually heals rapidly, and, provided there is no accompanying concussion of the inner ear, without much impairment of the hearing. Therefore, *the best treatment is to leave them alone*, merely protecting the ear by a light plug of wool. Syringing with water, or soap and water, is liable to infect the tympanum and cause suppuration.

A not uncommon injury of the ear is that resulting from fracture of the base of the skull, the fracture passing through the temporal bone. This may rupture the drum-head or may pass through the inner ear, leaving permanent deafness. Such injury may be followed by severe inflammation of the labyrinth. In cases of deafness following a fractured skull, it is not always easy to tell how much damage

has been done or whether the loss of hearing will or will not be persistent; some cases gradually recover, but if recovery does not take place in six months the chance of restoration of hearing is very unlikely.

Concussion of the ear, though usually due to severe blows or falls on the ear, may occur from quite small injuries, even occasionally from a light blow on the ear with the open hand. It may mean permanent deafness, but slighter cases usually recover. It is well here to warn the reader against the senseless habit of 'boxing the ear' as a punishment or in play. Serious consequences may ensue, especially if the victim suffers from middle-ear suppuration. Nature has endowed the child with an ideal spot for physical correction, and to punish him by striking the head or boxing the ear is to risk visiting a small offence with a disastrous and permanent disability.

Effects on the Ear of High Explosive Shells, etc.—The present war has resulted in a large number of cases of temporary and permanent deafness incurred on active service. Rupture of the drum membrane is of fairly common occurrence. Apart from actual injury of the ear by projectiles, etc., a considerable number of cases have arisen in which there is nerve deafness in high degree. Some of these are permanent, some are recovered from. So far as has been ascertained at present, these cases may be divided into four classes: (1) 'Fatigue paralysis,' from over-stimulation of the auditory nerve; this may lead to permanent deafness. (2) Shock to the nerve elements, permanently damaging them. (3) Cases allied to hysteria; to this category belong those interesting instances of deafness, dumbness, and blindness after burial in the earth thrown up by a shell. (4) True concussion of the labyrinth.

CHAPTER VIII

THE PREVENTION OF DEAFNESS

THE reader who has given any real thought to what has been said in the previous chapters cannot fail to appreciate that the greater number of the diseases of the nose, throat, and ear are to a marked degree preventable, and that in *prevention* the future of the treatment of these diseases lies. As a matter of fact, the whole medicine of the future is preventive ; it is in the nature of progress that it should be so, and, as time goes on, every branch of medical science will take more and more of a preventive character. That branch which deals with the treatment of diseases of the ear, nose, and throat, and of the deafness arising therefrom, is of comparatively recent origin, and, during the last quarter of a century, has made great strides. Hitherto, however, it has dealt rather with by-products. It has perfected the treatment of abscesses within the skull and of the numerous other serious and often fatal complications which may arise during acute and chronic suppuration in the middle ear, but too little attention has been paid to the great importance of promptly interfering with their original causes, although much valuable work has been done in the

elucidation of such causes. The record is less satisfactory in the case of chronic middle-ear catarrh; in spite of the fact that its causes are well known, little has been effected in the prevention of the terrible infirmity to which they lead, and many persons have been and still are allowed to progress to serious or complete deafness without adequate struggle to avert it. The means at disposal for the relief of deafness once established are often wholly insufficient to alleviate, and the sufferer has to be content with such artificial aids as trumpets, tubes, or lip-reading. Yet there is no reason why deafness, as confidently asserted by Dr. Kerr Love, may not be made to pass away from our midst.

Deafness has been taken lying down by the profession and the laity for too many years. It is time that this was fully realized in order that the means for prevention, near to hand, are taken universally. According to the statistics of the Census for 1911, there are, in the United Kingdom, 26,649 persons classified as 'deaf and dumb.' This takes no account whatever of the numbers who have become deaf in youth, young adult and later life. When it is realized what an enormous loss of otherwise serviceable citizens this means to the State, the argument for prevention will come home with greater force. The majority of specialists is fully aware of the direction in which the prevention of deafness lies, but it needs a great movement, in which the laity must take part, to give the necessary stimulus for prevention to be carried out. In order that such

a movement may be initiated it is essential that the laity should be put into the possession of the salient facts relating to deafness and its origin. These facts, once grasped, should arouse those previously ignorant of them to a sense of what is going on around them, and stimulate public men and responsible bodies to set going the machinery of efficient prevention.

Besides the deafness which has been dealt with in the last chapter, there is the form which is already present at birth. There are thus two forms of deafness, the *congenital* and the *acquired*. Prevention must, therefore, be discussed under both these heads.

Congenital deafness may be divided further into two classes, that which is hereditary and that which occurs in isolated cases in families in whom no hereditary tendency can be detected. Until quite recently both these groups have been confounded together, but, largely owing to the research of Dr. Kerr Love, they are now distinguished as entirely separate.

By true hereditary deafness is meant that form of deaf birth in which the condition makes its appearance in several members of a family, these members being found in successive generations and collateral branches, and it is not enough that they should occur merely in one generation, for it is possible that, where several brothers and sisters are born deaf, it is rather an instance not of true hereditary deafness but of 'sporadic' deaf birth, due to some such cause as syphilis. A good deal of light has lately been thrown

upon the problem of true hereditary deafness by the application to it of what is known as the Mendelian theory. The Abbé Mendel, who lived from 1822 to 1884, first published his work in 1865. He sought to discover, by practical experiment, the law of inheritance in cross-bred varieties. Selecting for his investigations the edible pea, and having defined certain differentiated characteristics of its varieties, he made crosses between these, investigating one character at a time. He found that the hybrid offspring showed *one* of each pair of characters, to the total, or almost total, exclusion of the other, without any intermediate forms appearing. The prevailing character Mendel described as *dominant*, and the character that was suppressed, or apparently suppressed, he called *recessive*. In order to make the explanation brief, one illustration only need be taken. If a tall pea plant is crossed with a dwarf one, the offspring are tall, so that 'tallness' is the dominant and 'dwarfness' the recessive character. In the next generation, the cross-bred plants are allowed to fertilize themselves, and the result shows that their offspring exhibit *the two original forms*, in the average proportion of three dominants to one recessive (out of 1064 plants, 787 were tall, 277 were dwarf). Further experiment shows that the recessive character breeds true, for, if allowed to fertilize themselves, the dwarfs give rise only to dwarfs, for any number of generations. The dominants, on the contrary, on self-fertilization, produce one-third 'pure' dominants, which in subsequent generations

give rise to dominants only, and two-thirds ' impure ' dominants which, on self-fertilization, produce a mixture of dominants and recessives in the proportion of three to one.

Without going further, it may be stated that Mendel's theory gives an explanation of the fact that deaf birth may appear in (formerly) unexpected fashion in families showing hereditary deafness. If no further fact were made patent than that the union of two hereditary deaf persons may give rise to deaf-born and hearing offspring and that the latter may carry the recessive character of deafness, and so may, even if mated with hearing persons, produce further deaf-born children, that fact alone is of vast importance. From the study of such imperfect family trees as we possess of hereditary deafness, hearing appears to be the dominant and deafness the recessive character. Hence, in order that the number of hereditary deaf-born persons may be reduced, it is important that those known to carry the recessive character should not be allowed to mate together, or that, if permitted to marry, they should mate only with hearing persons whose family histories are without taint of deafness.

In dealing with the prevention of true hereditary deafness, therefore, the questions to be considered are mainly social and educational. Putting aside those families in which mental defect, imbecility, or epilepsy are associated with the deafness, the grave defect to be remedied and which leads inevitably to the intermarriage of deaf persons, is the

segregation of the deaf in residential institutions, and their acquisition of a language, that of signs, which can only be understood amongst themselves, or by a limited number of hearing persons who pass their lives amongst them—certainly not by the outside community. What is required is that the deaf should associate more with hearing persons and less with one another, and that, by means of speech taught by the oral method and lip-reading, they should be able to communicate with their hearing fellows on a footing of greater equality. To this end the day school system and instruction by the oral method requires to be made more universal. There are persons, happily diminishing in number (as reactionaries generally do in the face of progress), who would make of the deaf a class apart. Such persons are doing a grievous wrong to the very class they believe they are benefiting, for they deprive the deaf of free intercourse with the hearing and force them to intermarry in their quest of sympathy and family life.

When deaf birth occurs unexpectedly in one or more members of a family, in which there is no sign of true hereditary deafness, the question is different. This form of isolated deaf birth is known as *sporadic* congenital deafness. A certain number of cases hitherto so classified prove to have acquired their deafness at a very early age (before two years), but a considerable percentage of them are born deaf. The cause is complex and depends chiefly upon overcrowding, untreated syphilis, uncontrolled use

of alcohol, and carelessness in the upbringing of children. As might be expected, the social status of the families from which they spring is that of the very poor, often of extreme poverty. The means of prevention lie in better housing, better feeding, better care of mothers, and the fighting of the drink curse, and the awful problem of the 'white scourge.' It is impossible to enter on these matters in detail here, but the subject cannot be better put than it has been in Dr. Kerr Love's remark: 'If deafness is to be prevented, there must be decent and healthy conditions for the children of the poor during the first years of life. Like a plant, or any young animal, they must have simple, clean, free conditions of life. This is the first step for the prevention of infantile or sporadic congenital deafness.' The reader who wishes to pursue the subject in detail should consult the publications of the National Bureau for Promoting the General Welfare of the Deaf.

It is incumbent now to deal with the prevention of *acquired* deafness, much of which has been, of necessity, foreshadowed in the last chapter. It must, however, be discussed as affecting both the child and the adult, although it practically goes without saying that prevention of deafness in the child means prevention of a large percentage of deafness in the adult. It is in the domain of acquired deafness that preventive measures are likely first to meet with most success, and if such success could be achieved the vast majority of cases of deafness would pass from our midst in a comparatively short time.

In children, the three great groups of causes of

acquired deafness are meningitis, the infective diseases, and primary ear disease. As an illustration of the relative number of cases under each heading may be taken the following figures, already published by the writer. Out of 982 cases of acquired deafness in children, there were :

Meningitis . . .	236	or	25.05	per cent.
Infective diseases . . .	360	„	36.6	„ „
Primary ear disease . . .	386	„	39.3	„ „
	<u>982</u>			

Meningitis is a more potent cause than even these figures indicate, since among the cases arising from infective diseases a considerable number are due to inflammation of the membranes of the brain occurring as a complication. Meningitis owns many causes, tubercle, syphilis, and pneumonia among the number, and, until its many forms and causes are worked out, the prevention of deafness arising from it cannot adequately be proceeded with. Research is necessary, and for its institution it is important that every case should be controlled by notification, for purposes of isolation, investigation, and treatment. The importance of investigating the causes of meningitis is even wider than as concerns the prevention of deafness alone, for this disease causes as many deaths as scarlet fever and measles put together. In 1909, the deaths from meningitis, not including over 10,000 due to convulsions (many of which were certainly instances of meningitis), or those in which the meningitis was a complication of scarlet fever or measles, was 11,118, and in 1912 the deaths from

meningitis *in London alone* were 1587. Since this book was first published, two important steps have been taken towards the prevention of meningitis; the elucidation of the genesis of epidemic cerebro-spinal meningitis (spotted fever), and the compulsory notification of measles.

The second group of causes—the infective diseases—includes such maladies as scarlet fever, diphtheria, mumps, small-pox, whooping cough, tuberculosis, and syphilis. Tuberculosis attacks the ear of infants and young children, and may cause great destruction of the organ and so of its function. It is, however, a disease which tends to kill, and the majority attacked by it die before school age. The prevention of deafness in this condition is, therefore, almost entirely a question of the prevention of tuberculosis generally, for the treatment of the ear complication is too often one in which function has to be sacrificed in the attempt to save life. Tuberculosis is one of those diseases the terrible nature of which has arrested public attention, with the result that it is slowly, but surely, being driven from our midst by modern methods of hygiene, backed by legislation. Happily for the future of the nation, public attention is similarly being roused to the awful ravages of that great scourge of the race, syphilis, and, no doubt, if the same methods, aided by the flooding light of widely disseminated knowledge with which tuberculosis is being overwhelmed, were pursued in the case of syphilis, the latter would be shorn as easily of its terrors. Syphilis has been mentioned in the last chapter as a cause of both deaf

birth and acquired deafness, and there is no disease more disastrous to child health or more destructive of child life. An infectious disease, due, like many other diseases dealt with in a scientific and rational way, to a micro-organism, it enters the blood of the parents and is transmitted to their offspring. Children it stunts, dwarfs, kills. Many children thus tainted are still-born or die within a few months or during the first year, whilst of the survivors many become blind, deaf, or both. Many of the child deaths attributable to the disease occur from meningitis, and it is by meningitis, when it does not end fatally, that it causes brain defects. Deafness may occur before birth, either from prenatal meningitis extending to the inner ear, or by disease beginning in the inner ear itself. Yet syphilis is a disease very amenable to treatment, and it is only because it is allowed to go untreated that it is transmitted to the child. It was long ago pointed out that the children who become deaf or blind are those *in whom treatment was neglected in infancy*. Such cases cry out for *prevention*, which can alone eliminate them.

Of the other infectious diseases, the greatest offenders are scarlet fever, diphtheria, and measles. Much has been done by isolation in preventing their occurrence. As modern methods progress, they ought to be stamped out as surely as small-pox has been eradicated, or, when it does occur, bereft of its greatest terrors. But, unfortunately, the special treatment, during the actual attack of these diseases, of their ear complications has not been so satisfactory.

Cases of scarlet fever, diphtheria, and measles are often sent out of the fever hospitals before ear discharge has ceased, and often this ear discharge carries infection. The three diseases mentioned may cause deafness in one of three ways, by meningitis, by middle-ear suppuration, or by middle-ear catarrh occurring later. It is the complication of suppuration that requires most to be considered here. This form of ear disease is not only often infectious, but it tends to remain, to destroy hearing, and to kill. A fatal result may be delayed for years, but it is none the less sure. More operations on the ear are necessitated by the serious brain and other complications of ear discharge following scarlet fever, diphtheria, and measles than in any other form of disease of that organ. The time comes when the surgeon has no alternative but to sacrifice function to save life; often the destruction wrought by the ear disease has already destroyed the greater part of the hearing. The proper treatment of these conditions is to prevent them when they threaten or to interfere promptly when they occur. Hence efficient treatment can only be carried out in the fever hospital itself. Such measures require the skill of the expert, and the British Medical Association, the International Congress of Medicine in 1913, the National Bureau, and many medical officers of health, have combined to insist upon the urgent necessity of adding specialists to the staffs of fever hospitals for this purpose. Such, however, is the short-sightedness of modern politicians that, in spite of

repeated representations from influential medical bodies, the authorities have, so far, refused to move in the matter. Government by vote-seeking lawyers is not the form most likely to take notice of them.

Lastly, there remains to speak of the prevention of acquired deafness due to primary ear disease. This problem is, again, largely bound up with the prevention of such deafness in the child. The majority of cases of deafness in young adults originates, as has already been pointed out, during childhood, and it is, therefore, the child that must be dealt with. The medical inspection of school children is doing a great deal in this direction and will do still more when the treatment which is its ultimate aim is placed upon a sure and common-sense foundation. For this work to be carried out efficiently it must be done by specialists, who alone at the present time have the greater experience necessary to the end in view. School Clinics and Treatment Centres for dealing with aural disease in children should be in charge of specialists, or, failing that, so organized as to be under specialist supervision. There is no lack of competent men to do the work, and they alone can do it efficiently. It has already been stated that middle-ear deafness comprises about eighty or ninety per cent. of all forms of deafness, and that ninety per cent. of these cases owe their origin to inflammatory conditions in the naso-pharynx, whence they extend to the ears. The most frequent predisposing cause of middle-ear disease thus induced is the presence of adenoids, and systematic examination of the ears of adenoid

children has shown that in a high percentage—probably seventy-five per cent.—there is some ear involvement. Moreover, those who have studied the matter are convinced that many cases of middle-ear deafness first noticed in adult life have their origin in inflammatory conditions of the nasopharynx, *dating from childhood*. The routine treatment of chronic catarrhal deafness, once it has gained a hold, leaves much to be desired. Hence the only sure way of reducing the number of cases of irremediable chronic deafness due to this cause is by prevention, and it is probable that in no other field of preventive medicine are there better opportunities than in the prevention of chronic middle-ear catarrh and the progressive deafness which results therefrom.

Whilst much could be accomplished by the prevention of the conditions which lead to ear diseases in children, and by the prompt and efficient treatment of them when they threaten, so that they may be stopped at the outset, there is plenty of room for improvement in their management when they are established. The grave operations which are often necessary in middle-ear suppuration not infrequently seriously and permanently impair the hearing, and more attention should be paid to the preservation of that function. In middle-ear catarrh due to adenoids, it should always be borne in mind that the removal of the cause is not the be-all and end-all of treatment, but that the ears often require treatment, systematic and sometimes prolonged. Parents, especially among the poor, are often greatly to blame

for failure, because they are inclined to think that mere removal of adenoids will work a miracle, and they will not trouble to ensure that the doctor has full opportunity for treating the effect when the cause has been removed.

Another point, and one which has engaged the attention of specialists of late, is the necessity for a better and more systematic training of students in the knowledge and management of diseases of the ear. Once qualified, the doctor has plenty of excellent post-graduate courses which he can attend, but it is only the minority that can afford the time and money which such instruction demands. The teaching should be done during the doctor's student career, and the course should be not merely obligatory for attendance, but the knowledge gained therefrom should be tested in the examination for qualification, and the examiners should be specialists appointed for that purpose. The more general practitioners are thoroughly well grounded in the principles of aural and nasal surgery, especially in relation to children, the more successfully will prevention be carried out. Already a great improvement in this direction has shown itself in the past decade.

When deafness arises in adult life the doctor is too frequently greatly handicapped by two facts: firstly, the patient delays too long before he seeks advice; and secondly, advice is not taken when it is obtained. The specialist cannot be blamed for failure when either of these things happens. It is a

failing of human nature in some persons that they always fancy they know better than those whose knowledge is the result of long study. It has been said that every man over forty is either a fool or a physician; he is more often the former. Another failing of human nature is a tendency to believe most in those who shout loudest. Hence the readiness with which people will consult the quack who advertises his ability to do the most impossible things rather than the professional man who possesses the real knowledge which comes of special study. One of the curses of the present day is that so few people stop to think; if they did so, a moment's reflection would convince them of the absurdity of the quack's pretensions. If those who suffer from disease would but reflect, the doctor would be more often consulted before it is too late to treat successfully.

Many cases of incurable deafness arising in adult life could be arrested and even greatly improved by timely treatment. This is especially the case with middle-ear catarrh, which can often be cured or prevented from further progress by the efficient correction of nasal abnormalities. There are very few cases which cannot be successfully treated *provided they are taken in time*.

In diseases of the inner ear the probabilities of prevention are less, but there are certain conditions in which it is possible. Such disorders as drug deafness, deafness from the poisoning due to intestinal causes, and boilermakers' deafness are cases

in point. The deafness due to advancing years cannot be stopped, but it could often be warded off by better care of the health generally, especially of the digestive system, and avoidance of the causes which lead to degeneration of the arteries.

CHAPTER IX

QUACKS AND THEIR METHODS

IT is fitting that this book should conclude with a few words of warning against the quack, who waits, like the proverbial spider, for the unfortunate deaf fly to walk into his parlour, and whose glowing and mendacious advertisements infest the columns of the daily press. A quack, according to the dictionary, is 'a pretender to medical skill; an ignorant practitioner or empiric.' Steele, in the *Spectator* for July 30, 1712, remarks: 'Quack doctors who publish their great abilities in little brown billets, distributed to all who pass by, are to a man impostors and murderers.' The age of newspaper advertisements has made the 'little brown billets' things of the past, but the universality of the press, whilst it has widened the quack's opportunities, has not made him any the less an 'impostor and murderer.' The charlatan is the necessary corollary to human credulity. Diseases of the ear, nose, and throat form one of his most remunerative hunting grounds, since they comprise some of the most serious disabilities under which mankind can suffer. The readiness with which human nature will turn rather to those who boast of impossible powers than

to those who possess the skill gained by long practice and wide experience has already been commented upon ; it is the same trait that leads to the foundation of ' fancy religions,' to attendance at spiritualist séances, or recourse to fortune-tellers, ' clairvoyants ' and crystal-gazers. But, ludicrous and degrading as are the superstitions connected with the pursuit of the so-called ' occult sciences,' the unscrupulous persons who pander to them perpetrate less harm than does the quack who seeks to fatten upon the sufferings of his fellow-creatures.

A knowledge, however limited, of the anatomy of the ear, nose, and throat cannot fail to demonstrate the delicacy of their mechanism and the ease with which they can be thrown out of gear by the diseases which may affect them. Such knowledge should show how impossible it is for any universal panacea to exist which can cure, or even alleviate, their disorders, so that, indeed, in almost every case the quack is convicted by his own boasting. What motorist would give fifty times its value for an oil which, rubbed on the bonnet of his car, was supposed immediately to remedy a defective cylinder ? Yet the same man would pay a guinea for an ounce of scented vaseline to rub behind his ear as a sure and certain cure for all sorts and conditions of deafness, because its vendor proclaimed its fictitious value in the columns of a halfpenny paper. The evidence given before the recent Select Committee of the House of Commons to inquire into Proprietary Medicines revealed an appalling mass of cunning and often

dangerous contrivances, pharmaceutical and instrumental, for the extraction of money from credulous sufferers, whilst, from time to time, similar evidence is furnished by the Law Courts.

Unfortunately, the daily press is ever ready to insert advertisements of quack remedies, and the countenance thus lent to the harpies who contrive them is a disgrace to the profession of journalism. Certain publications stand out as honourable exceptions in resolutely refusing to be parties to this abuse. *Truth* has done yeoman service in its relentless exposure of quacks and by the compilation of its excellent 'Cautionary List.' The *British Medical Journal*, by its volumes on 'Secret Remedies,' has analysed several and much advertised nostrums. A coalition of the great publishing firms and newspaper proprietors, pledged to refuse all suspicious advertisements, would result in protecting thousands of credulous persons from becoming the victims of unscrupulous charlatans. Since the law is made for the protection of fools, stringent legislation against quacks is urgently needed, and, if the newspapers will not move for themselves in the matter, a government censorship of advertisements should be established.

Out of some thirteen names of fraudulent ear quacks pilloried in *Truth's* Cautionary List for 1912, five are the aliases of one man, and one of his remedies, the application of which cures all forms of deafness, consists solely of scented vaseline! Most of the quack nostrums applied to deafness fall into one of

three classes: the application of plasters, sprays, snuffs, ointments, and the like; ear-drums and 'electric batteries.' These 'cure without fail every form of deafness,' the absurdity of which claim should be self-evident, and their cost is always in inverse proportion to their intrinsic value. Often, moreover, they preface their advertisements and pamphlets by an account of the anatomy of the ear, culled from some text-book, with more or less accuracy, and interlarded by some unintelligible jargon designed to show how especially suited to such a mechanism as the ear is their particular ware.

Practically all these quacks profess to treat their victims by correspondence, sending a form containing various printed questions, with blank spaces for the replies. It is a well-known fact that patients are notoriously prone to exaggerate and to misrepresent their symptoms, and it is only by personal examination and careful cross-questioning that the surgeon can arrive at a diagnosis. No physician or surgeon would undertake to treat by correspondence a patient he had never seen, and the absolute futility of such a procedure was demonstrated repeatedly in a famous libel cause which dragged through more than one long trial in the High Court. The usual method of the quack on receiving his worthless 'correspondence form,' filled in with equally worthless answers, is to forward to the sufferer a stereotyped letter stating that 'after careful consideration' the cause of deafness is so-and-so, and 'though presenting grave and serious features is not without

hope of cure' *provided* the particular nostrum is purchased. Once purchased, the patient can put it in the fire or rub it on the cat ; the result to both vendor and purchaser is the same. The writer has had considerable experience of these letters, and *in every case* the ' diagnosis ' has been the same, whether the patient was suffering from accumulations of wax, middle-ear suppuration or catarrh, or internal-ear deafness.

But, apart from the directly fraudulent nature of his methods, the quack does a harm which is incalculable in other ways. He may prescribe drugs or appliances which are unsuitable, and therefore injurious to the person who has got into his clutches ; or, and this is much more far-reaching in its effects, he may render the case hopeless by preventing the patient from seeking the skilled advice of a surgeon. The writer has known personally such cases, and calls to mind one in particular of a patient who, suffering from hoarseness of some standing, applied to a quack who styled himself a ' catarrh specialist.' He sent her the inevitable form to be filled up, and, on its return, forwarded a diagnosis of ' chronic catarrh of the upper air passages and especially of the voice-box or laryngitis.' For six months she used his sprays and vapours and took his physic, at eighteen shillings a bottle. Then, finding herself worse instead of better, she was prevailed upon to consult a laryngologist. She was then found to be suffering from cancer of the larynx, and that, owing to the delay caused by the quack's ' treatment,'

it had become past any hope of cure by operation. The poor patient died a distressing death, but the quack, who ought to have been hanged as a murderer, went free.

Leaving entirely out of consideration for the present such aids to hearing as those which have their foundation upon a combination of the telephone and the microphone, it may be stated at once that the so-called 'electrical' appliances possess, in no single example, any electricity at all. There have been exploited from time to time certain fraudulent contrivances purporting to be powerful galvanic batteries, for the restoration of a lost voice or a vanished hearing, which are really not 'batteries' at all. A cunning device is to accompany them with a small mariner's compass the deflection of which, on approaching it to the 'battery,' is supposed to prove the electric current generated, the deflection really being caused by the iron in the contrivance.

Probably owing to the fact that the drum-head is popularly supposed to be the essential organ of hearing, a lucrative appliance to the quack is the so-called 'artificial ear-drum,' intended to be placed in the outer passage of the ear in contact with the drum-head, and supposed to convey sound to that structure. Sometimes it is advertised with a lurid illustration in which forked lightning emanates from the instrument, apparently intended to convey the idea that electric currents are generated by it which intensify the sound. The only practical service that an 'artificial ear-drum' can render is

to support the ossicles when the drum-head is weakened by thinning or by a perforation, and the simplest form—a pellet or wick of moistened cotton—is the most efficient. Most of those vaunted by quacks are unsuitable and dangerous. Placed in an ear which is the seat of suppuration, they may prevent the escape of discharge and so bring about serious complications, or they may act as irritating foreign bodies which increase inflammation or set it up if it is not already present. It not infrequently happens that the surgeon's aid is invoked to remove an artificial drum that has become wedged in the passage, and is causing pain and irritation. Lastly, and this may appear to some persons of more importance as touching that most tender part, the pocket, they are charged at a price far in excess of their intrinsic value, from half-a-guinea to two guineas being demanded for a contrivance worth about twopence-halfpenny.

It must be remembered that the number of cases in which an 'artificial drum' is of service is very limited; that in such cases the simplest is the best; that *in no case* should it be worn save under the advice of a surgeon; and that it should be of such a nature as to be easily removable. The quack 'drum' is supplied indiscriminately to every sufferer applying to its vendor for relief, and the form thus sold is of a type wholly unsuitable and likely, once inserted, to be removable only with difficulty. 'Drops' to be used with them, costing about twopence at the most to make, and charged at from eighteen to twenty-

five shillings, are usually insisted upon as an absolute necessity.

Of recent years a new form of aid to hearing has been introduced, quite different to the artificial drum, conversation tube, or trumpet. This is the combination of telephone and microphone already alluded to, and its varieties may be classed under the general term 'ear telephones.' These aids to hearing have already been found very useful, but it must be remembered that they are at present quite in their infancy. There are already many forms upon the market, and a tendency has been shown by some vendors to exploit them as a universal 'cure' for all forms of deafness. Some of these instruments are of a high order of efficiency; others are practically worthless. It may be said at once that no single instrument has yet been devised which will suit every case, nor will it require much reflection to recognize that the invention of such an apparatus is highly unlikely, if not impossible. Different instruments, like different spectacles, suit different cases, and, therefore, no deaf person should be so ill-advised as to obtain one, however glowingly advertised, without first seeking the advice of a specialist. There are at the present time two or three scientific workers engaged in research into these telephone aids, and the reader is reminded that such workers do not advertise themselves in laudatory terms in the columns of the daily or the illustrated press; those who do so are not scientific searchers after truth, but quacks seeking to enrich only themselves.

Before concluding these remarks upon quacks, two methods of treatment which have been introduced recently claim some attention. The first is the so-called 're-education of the hearing'; the second is radium, or some form of radio-activity. Both forms of treatment are still under consideration, and neither has yet been proved to be of real service; indeed, both have been condemned by certain scientific investigators of repute.

Re-education of hearing aims, practically, at arousing the dormant nerve endings by exercising them with sounds produced electrically. Until extensive and very carefully checked experiments have been made by experts who are as free from bias as it is possible for the human animal to be, the method must remain entirely *sub judice*. So far as can be ascertained at present (and speaking quite dispassionately), any good results which have been reported cannot be attributed to anything more than ordinary 'suggestion.'

The same must be said concerning the employment of radium in deafness, a method which, from the present imperfect knowledge of this powerful agent, is, possibly, fraught with more danger than any other.

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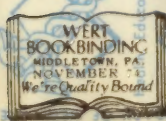
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